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Water-Supply Paper 507

SURFACE WATER SUPPLY OF THE UNITED STATES

1919-1920

PART VII. LOWER MISSISSIPPI RIVER BASIN

NATHAN C. GROVER, Chief Hydraulic Engineer
ROBERT FOLLANSBEE and R. C. RICE, District Engineers

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1922

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SURFACE WATER SUPPLY OF THE LOWER MISSISSIPPI RIVER BASIN, 1919-1920.

AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of 14 reports presenting records of measurements of flow made on streams in the United States during the years ending September 30, 1919 and 1920.

The data presented in these reports were collected by the United States Geological Survey under the following authority contained in the organic law (20 Stat. L., p. 394):

Provided, That this officer [the Director] shall have the direction of the Geological Survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

The work was begun in 1888 in connection with special studies relating to irrigation in the arid West. Since the fiscal year ending June 30, 1895, successive sundry civil bills passed by Congress have carried the following item and appropriations:

For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

Annual appropriations for the fiscal years ending June 30, 1895-1921.

1895	$12,500.00
1896	20,000.00
1897 to 1900, inclusive	50,000.00
1901 to 1902, inclusive	100,000.00
1903 to 1906, inclusive	200,000.00
1907	150,000.00
1908 to 1910, inclusive	100,000.00
1911 to 1917, inclusive	150,000.00
1918	175,000.00
1919	148,244.10
1920	175,000.00
1921	180,000.00

In the execution of the work many private and State organizations have cooperated, either by furnishing data or by assisting in collecting data. Acknowledgments for cooperation of the first kind are made in connection with the description of each station affected; cooperation of the second kind is acknowledged on page 5.

Measurements of stream flow have been made at about 5,000 points in the United States and also at many points in Alaska and the Hawaiian Islands. In July, 1920, 1,350 gaging stations were being maintained by the Survey and the cooperating organizations. Many

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miscellaneous discharge measurements are made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in water-supply papers from time to time.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those that represent a rate of flow, as second-feet, gallons per minute, miners' inches, and discharge in second-feet per square mile, and (2) those that represent the actual quantity of water, as run-off in inches, acre-feet, and millions of cubic feet. The principal terms used in this series of reports are second-feet, second-feet per square mile, run-off in inches, and acre-feet. They may be defined as follows:

"Second-feet" is an abbreviation for "cubic feet per second." A second-foot is the rate of discharge of water flowing in a channel of rectangular cross section 1 foot wide and 1 foot deep at an average velocity of 1 foot per second. It is generally used as a fundamental unit from which others are computed.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off in inches" is the depth to which an area would be covered if all the water flowing from it in a given period were uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

An "acre-foot," equivalent to 43,560 cubic feet, is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation.

The following terms not in common use are here defined:

"Stage-discharge relation;" an abbreviation for the term "relation of gage height to discharge."

"Control;" a term used to designate the natural section or stretch of the channel or artificial structure below the gage that determines the stage-discharge relation at the gage. It should be noted that the control may not be the same section or sections at all stages.

The "point of zero flow" for a given gaging station is that point on the gage—the gage height—at which water ceases to flow over the control.

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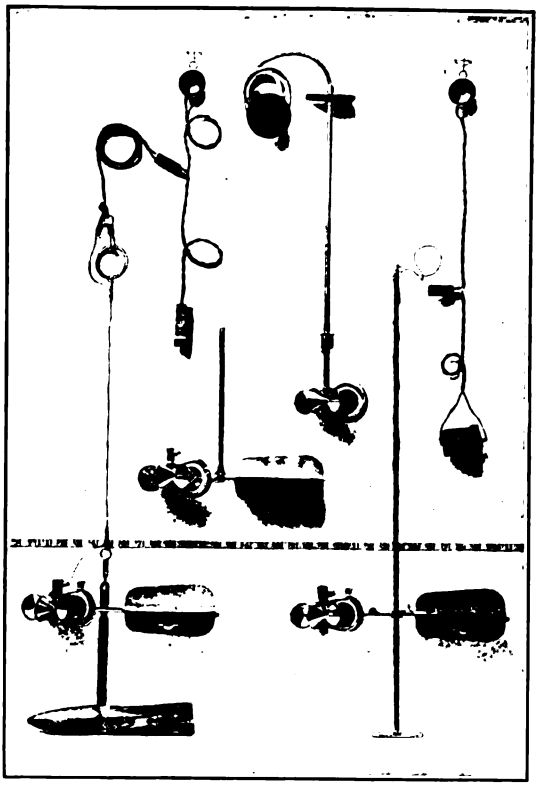
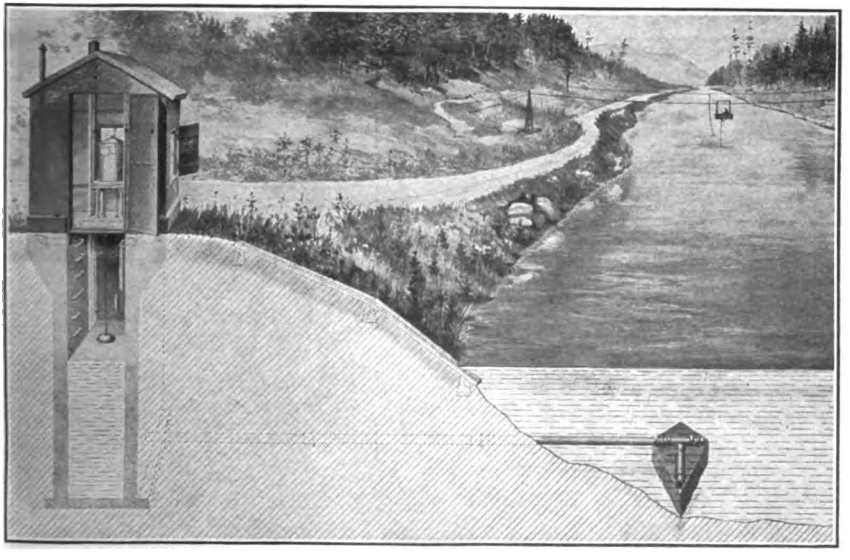


A. PRICE CURRENT METERS.



B. TYPICAL GAGING STATION.

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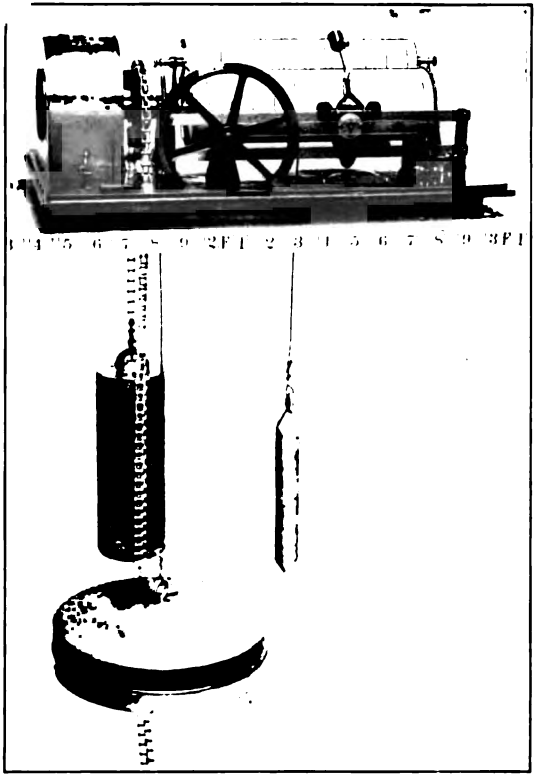
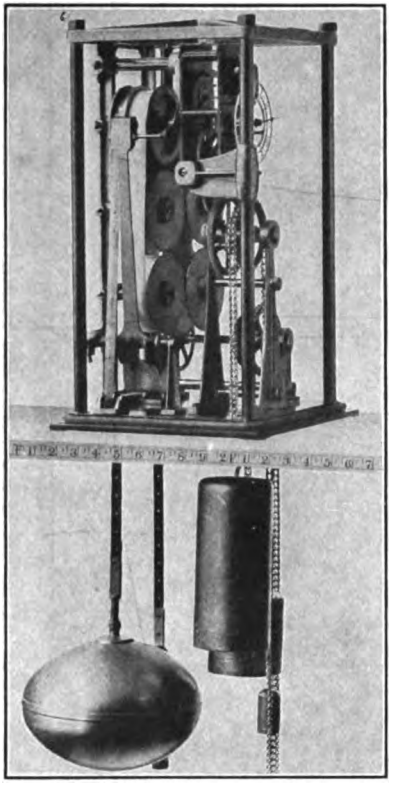
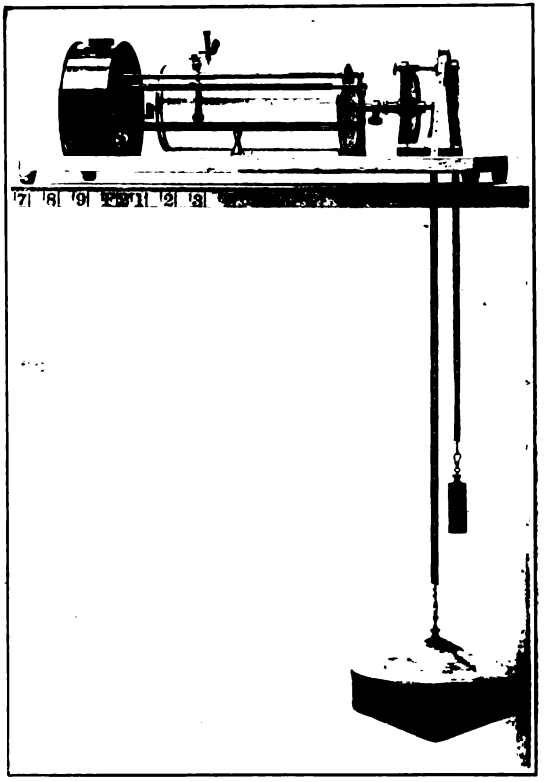


A. STEVENS CONTINUOUS.



B. GURLEY PRINTING.



C. FRIEZ.

WATER-STAGE RECORDERS.

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EXPLANATION OF DATA.

The data presented in this report cover the biennium beginning October 1, 1918, and ending September 30, 1920. At the beginning of January in most parts of the United States much of the precipitation in the preceding three months is stored as ground water, in the form of snow or ice, or in ponds, lakes, and swamps, and this stored water passes off in the streams during the spring break-up. At the end of September, on the other hand, the only stored water available for run-off is possibly a small quantity in the ground; therefore the run-off for the year beginning October 1 is practically all derived from precipitation within that year.

The base data collected at gaging stations consist of records of stage, measurements of discharge, and general information used to supplement the gage heights and discharge measurements in determining the daily flow. The records of stage are obtained either from direct readings on a staff gage or from a water-stage recorder that gives a continuous record of the fluctuations. Measurements of discharge are made with a current meter. (See Pls. I, II.) The general methods are outlined in standard textbooks on the measurement of river discharge.

From the discharge measurements rating tables are prepared that give the discharge for any stage, and these rating tables, when applied to the gage heights, give the discharge from which the daily, monthly, and yearly means of discharge are determined.

The data presented for each gaging station in the area covered by this report comprise a description of the station, a table giving records of discharge measurements, a table showing the daily discharge of the stream, and a table of monthly and yearly discharge and run-off.

If the base data are insufficient to determine the daily discharge, tables giving daily gage height and records of discharge measurements are published.

The description of the station gives, in addition to statements regarding location and equipment, information in regard to any conditions that may affect the permanence of the stage-discharge relation, covering such subjects as the occurrence of ice, the use of the stream for log driving, shifting of control, and the cause and effect of backwater; it gives also information as to diversions that decrease the flow at the gage, artificial regulation, maximum and minimum recorded stages, and the accuracy of the records.

The table of daily discharge gives, in general, the discharge in second-feet corresponding to the mean of the gage heights read each day. At stations on streams subject to sudden or rapid diurnal fluctuations the discharge obtained from the rating table and the mean

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daily gage height may not be the true mean discharge for the day. If such stations are equipped with water-stage recorders the mean daily discharge may be obtained by averaging discharge at regular intervals during the day or by using the discharge integrator, an instrument operating on the principle of the planimeter and containing as an essential element the rating curve of the station.

In the table of monthly discharge the column headed "Maximum" gives the mean flow for the day when the mean gage height was highest. As the gage height is the mean for the day it does not indicate correctly the stage when the water surface was at crest height and the corresponding discharge was consequently larger than given in the maximum column. Likewise, in the column headed "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet per second during the month. On this average flow computations recorded in the remaining columns, which are defined on page 2, are based.

ACCURACY OF FIELD DATA AND COMPUTED RESULTS.

The accuracy of stream-flow data depends primarily (1) on the permanency of the stage-discharge relation and (2) on the accuracy of observation of stage, measurements of flow, and interpretation of records.

A paragraph in the description of the station gives information regarding the (1) permanence of the stage-discharge relation, (2) precision with which the discharge rating curve is defined, (3) refinement of gage readings, (4) frequency of gage readings, and (5) methods of applying daily gage height to the rating table to obtain the daily discharge.

For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The monthly means for any station may represent with high accuracy the quantity of water flowing past the gage, but the figures showing discharge per square mile and depth of run-off in inches may be subject to gross errors caused by the inclusion of large non-contributing districts in the measured drainage area, by lack of information concerning water diverted for irrigation or other use. -- by inability to interpret the effect of artificial regulation of flow of the river above the station. "Second-feet per square ' and "run-off in inches" are therefore not computed if such

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errors appear probable. The computations are also omitted for stations on streams draining areas in which the annual rainfall is less than 20 inches. All figures representing "second-feet per square mile" and "run-off in inches" previously published by the Survey should be used with caution because of possible inherent sources of error not known to the Survey.

Many gaging stations on streams in the irrigated sections of the United States are located above most of the diversions from those streams, and the discharge recorded does not show the water supply available for further development as prior appropriations below the stations must first be satisfied. To give an idea of the amount of prior appropriations, a paragraph on diversions is presented in each station description. The figures given can not be considered exact but represent the best information available.

The table of monthly discharge gives only a general idea of the flow at the station and should not be used for other than preliminary estimates; the tables of daily discharge allow more detailed studies of the variation in flow. It should be borne in mind, however, that the observations in each succeeding year may be expected to throw new light on data previously published.

COOPERATION.

The United States Forest Service furnished winter readings on East Fork of Arkansas River and Tennessee Fork near Leadville, Colo. It also furnished the services of a hydrographer during the winter.

In Oklahoma the United States Reclamation Service paid a part of the expense of maintaining the gaging station on Medicine Bluff Creek near Lawton. The services of a gage reader on Little Medicine Bluff Creek near Lawton were furnished by the sanitary corps of the United States Army.

The station on Neosho River near Iola, Kans., was maintained in cooperation with the Kansas Water Commission, H. A. Rice, secretary.

DIVISION OF WORK.

Data for stations in Colorado and Oklahoma were collected and prepared for publication under the direction of Robert Follansbee, assisted by P. V. Hodges, J. B. Spiegel, T. J. Watkins, and Miss Esther M. Dye.

Data for the station on Neosho River near Iola, Kans., were collected and prepared for publication under the direction of R. C. Rice, district engineer, assisted by E. L. Grant and A. K. Gowans.

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GAGING-STATION RECORDS.

ARKANSAS RIVER BASIN.

EAST FORK OF ARKANSAS RIVER NEAR LEADVILLE, COLO.

LOCATION.—In sec. 16, T. 9 S., R. 80 W., at highway bridge 200 yards above junction with Tennessee Fork and 3 miles northwest of Leadville, Lake County.

DRAINAGE AREA.—52 square miles (measured on topographic map).

RECORDS AVAILABLE.—April 25 to August 31, 1890; June 18 to October 11, 1903; June 5, 1911, to September 30, 1920.

GAGE.—Vertical staff on left bridge abutment, near upstream end; read by E. J. Heaton and Fred Coquoz.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of coarse gravel and small boulders. Control 30 feet downstream from gage; shifted slightly during 1919. Banks low, subject to overflow at extreme high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 0.90 foot on June 1, 2, and 3 (discharge, 155 second-feet); minimum discharge occurred during winter.

Maximum stage recorded during year ending September 30, 1920, 1.63 feet at 9.15 a. m. May 31 (discharge, 521 second-feet); minimum discharge occurred during winter.

1911–1920: Maximum stage recorded, 1.95 feet at 8 a. m. June 12, 1918 (discharge, 680 second-feet); minimum discharge measured 5.4 second-feet on January 18, 1918.

ICE.—Stage-discharge relation seriously affected by ice.

DIVERSIONS.—The Leadville Water Co. makes a continuous diversion of 2 second-feet from East Fork above station. During the winter this diversion may be increased to 3 second-feet.

REGULATION.—None.

ACCURACY.—Stage-discharge relation shifted slightly during 1919. Rating curve used October 1, 1918, to June 30, 1919, well defined; shifting-control method used July 1 to October 31, 1919. Curve used during 1920 well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying daily mean gage height to rating table. Records fair.

Discharge measurements of East Fork of Arkansas River near Leadville, Colo., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 4	T. J. Watkins	[a] 0.38	11.2	June 18	Robert Follansbee	0.92	134
Feb. 18	do	[a] .47	10.1	July 22	P. V. Hodges	.54	41.4
July 22	Robert Follansbee	.49	41.0				
Nov. 1	T. J. Watkins	[a] .78	26.3				

[a] Stage-discharge relation affected by ice.

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Daily discharge, in second-feet, of East Fork of Arkansas River near Leadville, Colo., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.											
1	16	12						128	97	84	16
2	16	12						152	107	82	18
3	14	12						138	127	80	20
4	14	12	11					120	134	70	19
5	13	12						92	97	75	17
6	12						24	92	89	58	16
7	12							92	84	50	16
8	12							92	77	44	16
9	12							94	72	44	16
10	12							80	70	39	21
11	12						21	89	64	44	21
12	12				16	21		92	64	44	26
13	12							89	64	29	30
14	12							92	60	29	34
15	12							99	52	29	34
16	12						34	110	48	29	31
17	12					21		115	87	29	31
18	13			10	16			115	72	29	29
19	13							110	60	29	30
20	12							104	48	29	31
21	12					16		104	42	22	31
22	12				12			102	40	17	29
23	12							99	39	17	29
24	12							94	42	17	26
25	12							110	40	16	25
26	12							94	42	16	24
27	12				12			104	39	16	25
28	12					9		102	40	12	22
29	12							99	48	12	24
30	12							94	82	12	21
31	12				14				68	12	
1919-20.											
1	21	26					16	245	64	49	35
2	20							328	60	46	30
3	20							328	64	39	25
4	20							272	68	60	25
5	20							328	71	39	14
6	18							299	64	44	17
7	18							272	60	35	12
8	20							328	40	27	16
9	19							245	55	57	17
10	18							231	60	49	22
11	18							231	64	28	20
12	17							272	55	35	18
13	16							282	64	42	20
14	18							282	44	25	27
15	17						26	217	49	25	26
16	15							199	44	25	32
17	15							170	55	27	27
18	18							141	44	28	16
19	18							115	49	22	16
20	17							106	44	31	14
21	15							95	40	46	16
22	15							103	73	39	16
23	15							92	95	32	17
24	16							88	71	25	16
25	16						272	95	57	25	25
26	18						299	95	95	22	20
27	18						328	88	49	39	27
28	21						221	82	39	28	20
29	20						272	82	39	30	16
30	18						328	71	49	25	16
31	18						383		40	42	

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Monthly discharge of East Fork of Arkansas River near Leadville, Colo., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	16	12	12.5	769
November 1–5	12	12	12.0	119
June	152	80	104	6,190
July	134	39	67.6	4,160
August	84	12	36.0	2,210
September	34	16	24.3	1,450
1919–20.				
October	21	15	17.8	1,090
May 25–31	383	221	300	4,160
June	328	71	193	11,500
July	95	39	56.9	3,500
August	60	22	35.3	2,170
September	35	12	20.6	1,230

ARKANSAS RIVER AT GRANITE, COLO.

LOCATION.—In sec. 31, T. 11 S., R. 79 W., at Granite, Lake County, below mouth of Lake Creek and above Lost Canyon and Clear creeks.

DRAINAGE AREA.—425 square miles.

RECORDS AVAILABLE.—May 1, 1897, to September 10, 1899; April 6, 1910, to September 30, 1920.

GAGE.—Bristol float gage on right bank 200 feet below highway bridge at Granite. Prior to October 26, 1917, inclined gage located at left bank half a mile upstream. Relation between gages not determined.

DISCHARGE MEASUREMENTS.—Made from highway bridge near railroad station or by wading.

CHANNEL AND CONTROL.—Bed composed of coarse gravel and small boulders. Control shifting. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 3.44 feet at 7 a. m. June 30 (discharge, 1,230 second-feet); minimum discharge occurred during winter.

Maximum stage recorded during year ending September 30, 1920, 4.1 feet from 7 to 9 a. m. June 10 (discharge, 1,770 second-feet); minimum discharge, 54 second-feet on January 8.

1910–1920: Maximum stage, 4.7 feet June 11, 1918 (discharge, 2,630 second-feet); minimum discharge recorded, 11 second-feet on March 15, 1918.

ICE.—Stage-discharge relation not seriously affected by ice.

DIVERSIONS.—Court decrees for diversions of 90 second-feet from Arkansas River between this station and junction of Tennessee and East forks.

REGULATION.—Discharge affected by operation of Twin Lakes reservoir, which has a storage decree for 54,450 acre-feet.

COOPERATION.—Complete records furnished by State engineer.

Discharge measurements of Arkansas River at Granite, Colo., during the years ending Sept. 30, 1919 and 1920.

[Made by G. C. Price.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1919.	*Feet.*	*Sec.-ft.*	**1920—Continued.**	*Feet.*	*Sec.-*
May 14	1.74	29.2	Mar. 26	1.00	78
Dec. 17	1.32	97	Apr. 21	1.16	140
1920.			June 11	3.40	1,220
Feb. 10		65	July 28	2.51	639

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Daily discharge, in second-feet, of Arkansas River at Granite, Colo., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	182	232	48	.....	.....	.....	.....	275	940	970	510	205
2	174	232	48	.....	.....	.....	.....	295	910	1,050	476	247
3	216	237	62	.....	.....	.....	.....	275	928	1,160	525	240
4	256	232	48	.....	.....	.....	.....	205	1,100	1,030	476	233
5	160	237	57	.....	.....	.....	.....	205	1,100	1,030	417	205
6	168	229	66	.....	.....	.....	.....	240	1,050	970	375	205
7	174	221	76	.....	.....	.....	.....	240	970	970	355	175
8	170	190	48	.....	.....	.....	.....	258	880	940	347	140
9	170	203	62	.....	.....	.....	100	258	910	940	315	125
10	174	216	48	.....	.....	.....	132	268	868	940	315	151
11	180	242	48	.....	.....	.....	100	258	820	850	268	205
12	174	190	36	.....	.....	.....	100	258	880	645	247	190
13	174	190	26	.....	.....	.....	100	258	940	700	233	247
14	174	150	36	.....	.....	.....	130	295	940	760	247	355
15	166	110	36	.....	.....	.....	116	395	970	672	138	355
16	160	110	36	.....	.....	.....	110	395	1,000	672	618	307
17	166	110	48	.....	.....	.....	169	462	1,100	510	645	268
18	172	110	48	.....	.....	.....	205	562	1,100	440	645	268
19	172	92	48	.....	.....	.....	240	634	1,100	510	645	268
20	172	31	36	.....	.....	.....	258	730	1,130	395	645	250
21	190	62	62	.....	.....	.....	250	730	1,160	375	618	233
22	182	92	55	.....	.....	.....	295	820	1,130	315	562	190
23	174	31	48	.....	.....	.....	387	880	1,130	222	535	151
24	174	31	62	.....	.....	.....	404	910	1,100	205	485	151
25	190	36	62	.....	.....	.....	395	940	1,100	258	476	199
26	216	48	48	.....	.....	.....	379	1,000	1,060	375	418	222
27	211	62	48	.....	.....	.....	335	1,030	970	440	375	212
28	242	48	48	.....	.....	.....	347	1,080	970	440	347	199
29	242	48	48	.....	.....	.....	335	1,130	940	375	323	199
30	229	48	48	.....	.....	.....	307	1,160	940	485	307	175
31	216	.....	48	.....	.....	.....	.....	1,070	.....	485	258	.....
1919-20.												
1	140	175	132	90	74	65	78	247	1,260	1,450	688	195
2	128	145	120	57	74	74	78	266	1,180	1,490	603	229
3	233	145	125	81	74	78	78	304	1,330	1,490	576	229
4	275	145	132	90	65	78	90	304	1,290	1,650	576	195
5	275	145	136	90	65	78	90	344	1,370	1,610	576	195
6	132	120	136	73	65	90	84	344	1,450	1,570	550	229
7	175	124	136	57	65	78	101	430	1,490	1,410	525	229
8	175	124	120	54	74	90	124	550	1,570	1,260	476	229
9	175	134	90	65	65	90	150	603	1,690	1,150	476	229
10	205	134	100	80	65	90	136	630	1,490	1,080	430	229
11	175	134	100	60	65	90	124	576	1,260	1,010	386	195
12	175	124	120	65	57	90	101	500	1,450	1,010	386	163
13	175	120	100	74	57	90	112	500	1,690	975	386	195
14	175	120	90	74	57	112	112	453	1,610	908	344	163
15	175	120	90	74	57	101	124	386	1,610	908	344	163
16	175	120	90	74	57	101	136	386	1,690	940	688	163
17	175	120	97	74	57	101	212	408	1,610	975	688	163
18	175	120	98	74	65	101	344	476	1,530	842	688	163
19	175	128	98	74	74	90	344	603	1,450	810	688	163
20	169	128	98	74	74	112	195	718	1,450	659	688	163
21	145	128	98	65	74	124	112	748	1,450	718	386	195
22	145	128	98	65	74	136	112	875	1,490	718	344	195
23	145	128	98	74	65	124	124	875	1,530	748	688	195
24	175	128	98	57	57	101	136	940	1,490	748	688	163
25	175	128	98	65	57	90	136	1,010	1,490	908	630	163
26	175	100	95	74	57	78	136	1,180	1,490	1,040	630	163
27	145	95	80	74	57	78	136	1,120	1,490	875	630	163
28	145	100	80	74	57	84	136	1,040	1,490	630	576	163
29	145	125	80	74	57	84	150	1,150	1,490	630	525	163
30	145	132	90	74	.....	84	179	1,220	1,450	630	476	163
31	145	.....	95	74	.....	84	.....	1,290	.....	630	229	.....

NOTE.—Stage-discharge relation affected by ice Dec. 27-31, 1918; discharge estimated.

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Monthly discharge of Arkansas River at Granite, Colo., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	256	160	188	11,600
November	242	31	136	8,090
December	76	26	49.6	3,050
April 9–30	404	100	236	10,200
May	1,160	205	564	34,700
June	1,160	820	1,000	59,500
July	1,160	205	649	39,900
August	645	138	424	26,100
September	355	125	220	13,100
1919–20.				
October	275	128	172	10,600
November	175	95	127	7,560
December	136	80	104	6,400
January	90	54	71.1	4,370
February	74	57	64.2	3,600
March	136	65	92.5	5,690
April	344	78	139	8,270
May	1,290	247	661	40,600
June	1,690	1,180	1,480	88,100
July	1,650	630	1,020	62,700
August	688	229	534	32,800
September	229	163	187	11,100
The year	1,600	54	388	282,000

ARKANSAS RIVER AT SALIDA, COLO.

LOCATION.—In sec. 32, T. 50 N., R. 9 E., at Salida, Chaffee County, above mouth of South Fork of Arkansas River, nearest important tributary.

DRAINAGE AREA.—1,160 square miles.

RECORDS AVAILABLE.—April 11, 1895, to October 31, 1903; November 3, 1909, to September 30, 1920.

GAGE.—Bristol water-stage recorder on right bank in City Park 400 feet below highway bridge.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Bed composed of coarse gravel; shifts at intervals. No well-defined control. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 3.9 feet May 29 and 30 (discharge, 2,460 second-feet); minimum stage probably occurred during winter.

Maximum stage during year ending September 30, 1920, 4.7 feet from 6 to 11 a. m. June 9 (discharge, 3,430 second feet); minimum discharge, 170 second-feet several days during year.

1909–1920: Maximum stage, 6.2 feet June 13, 14, and 17, 1918 (discharge, 4,840 second-feet); minimum stage, 0.10 foot, January 28, 1915 (discharge, 155 second-feet).

ICE.—Stage-discharge relation not affected by ice, as river is kept open by springs.

DIVERSIONS.—Court decrees for diversions of 154 second-feet from Arkansas River between this station and Granite.

REGULATION.—Flow at station regulated to some extent by Twin Lakes and Clear Creek reservoirs, which have storage decrees for 54,450 and 11,500 acre-feet, respectively.

COOPERATION.—Complete records furnished by State engineer.

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Discharge measurements of Arkansas River at Salida, Colo., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Feb. 21	H. D. Amsley	0.39	239	Feb. 9	G. C. Price	0.40	234
Apr. 10	G. C. Price	.47	241	Mar. 25	do	.30	198
19	do	.73	397	Apr. 22	do	.42	255
May 15	do	1.44	666	June 12	do	3.96	2,620
June 5	do	2.76	1,500	July 27	do	2.80	1,430
July 20	do	1.90	913				
Oct. 28	H. D. Amsley	.73	333				
Dec. 15	G. C. Price	.42	264				

Daily discharge, in second-feet, of Arkansas River at Salida, Colo., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	390	335	266					550	1,940	1,540	1,000	450
2	390	350	266					500	1,780	1,820	850	450
3	390	390	266					500	1,660	2,280	970	450
4	470	350	266					500	1,620	2,100	970	480
5	410	350	266					450	1,500	2,000	910	480
6	430	390	266					450	1,460	1,860	800	425
7	430	370	292					450	1,460	1,700	775	380
8	430	370	292					500	1,420	1,700	850	360
9	430	370	266					500	1,320	1,580	750	352
10	390	390	266				241	500	1,390	1,540	725	500
11	390	390	242				264	500	1,390	1,440	675	640
12	430	390	242				288	450	1,460	1,320	640	575
13	320	292	242				258	500	1,660	1,180	560	600
14	320	292	220				258	550	1,700	1,100	550	640
15	320	320	220				258	650	1,860	1,180	550	88
16	320	292	220				258	725	1,780	1,180	710	735
17	350	292	220				320	750	1,940	1,140	910	675
18	350	266	220				320	910	1,980	1,100	850	600
19	350	279	220				340	1,110	1,940	970	910	640
20	320	279	220				360	1,500	1,980	910	850	600
21	320	266	220		239		380	1,700	1,980	850	850	590
22	320	266	220				450	1,900	1,940	825	840	560
23	320	254	220				500	1,860	1,860	700	800	500
24	320	247	220				625	1,780	1,780	650	750	450
25	350	242	220				650	1,860	1,740	650	700	475
26	370	242	220				675	2,020	1,700	700	650	540
27	350	220	220				650	2,190	1,620	775	660	550
28	335	220	220				600	2,280	1,580	800	600	525
29	320	220	220				575	2,460	1,540	825	550	450
30	320	242	220				550	2,460	1,520	910	540	450
31	335		220					2,100		1,110	525	

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Daily discharge, in second-feet, of Arkansas River at Salida, Colo., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	400	360	376	287	270	236	170	322	2,610	2,610	1,450	648
2	392	380	384	297	270	253	170	359	2,319	2,560	1,200	550
3	400	360	364	236	270	253	202	367	2,560	2,560	921	550
4	450	360	368	287	270	236	170	359	2,610	2,610	1,100	550
5	500	360	388	304	253	236	170	439	2,720	2,610	1,240	550
6	500	360	388	304	253	236	202	439	2,770	2,460	1,170	550
7	400	360	372	270	253	219	202	482	2,940	2,310	980	550
8	450	450	352	236	253	219	236	574	3,160	2,060	950	550
9	400	400	282	229	270	236	270	700	3,210	1,840	921	550
10	400	400	317	253	253	253	322	807	3,040	1,700	1,010	550
11	450	380	317	243	253	253	253	780	2,310	1,790	950	527
12	400	400	356	243	253	236	236	700	2,460	1,700	863	527
13	450	380	304	253	236	236	236	623	2,720	1,570	950	504
14	450	360	301	270	236	253	236	623	2,820	1,530	863	482
15	450	360	288	270	236	236	236	574	2,820	1,490	835	460
16	450	364	288	270	236	219	287	527	2,940	1,490	1,100	460
17	450	364	304	270	236	236	270	527	2,770	1,610	1,200	460
18	400	364	320	270	236	236	359	574	2,560	1,610	1,240	460
19	340	368	320	270	253	236	418	700	2,560	1,200	1,240	418
20	360	368	320	270	270	236	378	921	2,410	1,570	1,310	418
21	360	368	320	270	270	243	270	1,100	2,510	1,380	1,340	439
22	360	372	320	253	270	287	236	1,310	2,510	1,380	980	418
23	360	372	320	253	270	297	253	1,340	2,560	1,380	863	418
24	360	372	320	270	253	253	253	1,420	2,610	1,530	1,200	418
25	360	376	320	236	236	219	287	1,530	2,560	1,450	1,100	418
26	360	368	320	253	236	236	236	1,740	2,560	1,660	1,040	439
27	360	328	288	270	236	202	253	1,530	2,720	1,490	1,200	439
28	340	298	288	270	236	186	253	1,530	3,040	1,380	1,100	439
29	360	372	288	270	236	170	270	1,740	2,880	1,490	1,040	439
30	380	360	304	270	.....	186	287	2,110	2,720	1,530	921	398
31	360	.....	314	270	.....	186	.....	2,560	.....	1,450	863	.....

Monthly discharge of Arkansas River at Salida, Colo., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	470	320	364	22,400
November	390	220	306	18,200
December	292	220	239	14,700
April 10–30	675	241	420	17,500
May	2,460	450	1,130	69,500
June	1,980	1,320	1,680	100,000
July	2,280	650	1,240	76,200
August	1,000	525	750	46,100
September	800	352	529	31,500
1919–20.				
October	500	340	402	24,700
November	450	298	369	22,000
December	388	282	326	20,000
January	304	229	265	16,300
February	270	236	252	14,500
March	297	170	233	14,300
April	418	170	254	15,100
May	2,560	322	945	58,100
June	3,210	2,310	2,700	161,000
July	2,610	1,200	1,770	109,000
August	1,450	835	1,070	65,800
September	648	398	486	28,900
The year	3,210	170	757	550,000

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ARKANSAS RIVER AT CANON CITY, COLO.

LOCATION.—Just below Hot Springs Hotel, at mouth of canyon, 1 mile above Canon City, Fremont County. Nearest important tributary, Grape Creek, enters some distance above.

DRAINAGE AREA.—3,060 square miles.

RECORDS AVAILABLE.—May 1, 1888, to September 30, 1920.

GAGE.—Bristol float-type water-stage recorder.

DISCHARGE MEASUREMENTS.—Made from cable.

CHANNELS AND CONTROL.—Bed composed of gravel; very shifting. No well defined control.

EXTREMES OF DISCHARGE.—1888–1920: Maximum daily mean discharge recorded, 5,400 second-feet on August 18, 1909; minimum discharge, 108 second-feet on April 10, 1897.

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Court decrees for diversions of 176 second-feet from Arkansas River between this station and Salida.

REGULATION.—Flow regulated to slight extent by operation of reservoirs on head waters.

COOPERATION.—Complete records furnished by State engineer.

Daily discharge, in second-feet, of Arkansas River at Canon City, Colo., for the years ending, Sept. 30, 1914–1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14												
1	410	335	335	380	330	342	330	428	2,760	2,330	2,460	755
2	500	335	335	380	330	355	330	428	3,320	2,330	4,800	728
3	442	365	365	380	330	368	330	462	3,210	2,280	2,140	620
4	425	425	380	355	330	368	342	542	3,010	2,510	2,050	595
5	425	410	395	355	330	342	355	395	2,810	2,700	1,820	595
6	425	410	365	355	355	355	355	355	2,520	2,600	1,600	572
7	410	365	335	355	330	355	380	355	2,150	2,560	1,430	510
8	395	335	365	355	310	355	355	355	1,710	2,200	1,310	470
9	395	335	365	355	380	355	355	368	1,510	2,100	1,350	490
10	395	335	335	355	355	355	342	542	1,430	1,970	1,230	490
11	380	335	310	330	380	355	355	710	1,920	1,920	1,190	470
12	380	335	310	330	380	355	355	765	2,240	2,200	1,150	450
13	395	350	310	330	380	355	368	710	2,520	2,060	1,010	450
14	395	335	365	330	380	355	355	710	2,810	2,200	1,010	470
15	395	335	395	330	355	355	355	950	3,930	2,200	940	470
16	365	335	395	355	380	380	355	1,050	4,410	2,200	908	470
17	365	335	395	355	355	368	380	1,050	3,640	2,420	845	450
18	365	335	395	355	355	410	355	982	3,480	2,650	815	430
19	335	395	335	355	355	380	330	1,050	3,480	3,050	875	430
20	325	365	395	380	355	355	330	1,120	3,370	2,940	1,010	400
21	335	335	310	380	330	355	342	1,550	3,370	2,700	1,010	400
22	335	365	310	380	330	355	355	1,970	3,100	3,210	1,040	430
23	325	335	335	355	330	342	355	2,020	2,800	2,840	940	430
24	335	335	335	355	355	355	355	2,150	3,000	2,510	1,040	415
25	335	335	335	355	330	355	330	2,100	3,000	2,330	1,120	415
26	335	365	310	355	330	355	330	1,920	2,740	2,280	1,120	370
27	325	365	425	355	355	342	342	1,920	2,460	2,460	1,010	370
28	335	365	425	355	330	330	330	2,020	2,280	3,100	975	370
29	335	365	365	380	.....	330	330	1,880	2,200	3,260	940	370
30	335	335	335	310	.....	330	355	1,840	2,200	2,840	908	415
31	335	.....	335	330	.....	330	.....	2,200	.....	2,740	755	.....

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Daily discharge, in second-feet, of Arkansas River at Canon City, Colo., for the years ending Sept. 30, 1914–1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15												
1	430	470	.....	480	385	340	385	725	1,220	1,880	830	460
2	430	470	.....	480	385	385	385	595	1,940	1,720	725	460
3	430	450	.....	480	385	340	408	480	2,000	1,720	725	460
4	415	430	.....	480	385	340	430	430	1,880	1,620	628	465
5	430	450	.....	480	310	340	455	430	1,560	1,620	565	520
6	430	430	.....	430	280	310	480	480	1,510	1,620	535	525
7	430	470	.....	385	280	340	660	480	1,460	1,560	565	500
8	430	470	.....	385	340	340	692	535	1,320	1,410	692	465
9	430	400	.....	385	340	340	535	480	1,320	1,320	1,170	460
10	430	400	.....	430	385	340	628	430	1,410	1,270	1,120	435
11	430	400	.....	430	340	340	535	430	1,880	1,220	870	405
12	430	400	.....	385	340	340	480	455	2,530	1,220	770	440
13	430	400	.....	385	310	340	480	480	2,470	1,220	775	480
14	450	400	.....	385	310	340	480	870	2,000	1,220	745	450
15	370	400	.....	385	310	340	508	1,120	1,780	1,170	750	465
16	385	400	.....	385	310	340	692	1,080	1,720	1,120	685	410
17	400	430	.....	340	310	340	660	1,220	1,940	1,080	690	380
18	415	430	.....	340	340	340	910	1,320	2,060	910	760	360
19	400	450	.....	340	385	430	692	1,360	2,230	760	1,000	473
20	400	400	.....	385	385	362	565	1,270	2,530	910	730	450
21	400	415	.....	385	385	325	535	1,220	2,660	1,080	580	450
22	450	400	.....	385	385	340	535	1,040	2,780	1,040	525	450
23	490	385	.....	310	385	340	595	795	2,910	910	590	405
24	550	385	.....	295	385	408	595	725	2,980	1,080	620	315
25	550	370	.....	280	340	508	535	725	2,910	1,270	685	340
26	572	370	.....	280	340	480	508	832	2,840	1,360	600	525
27	595	370	.....	385	340	455	480	910	2,590	1,880	540	525
28	550	370	.....	310	340	430	480	760	2,350	1,940	545	450
29	530	370	.....	340	.....	430	480	725	2,110	1,510	520	400
30	490	400	.....	430	.....	430	628	725	2,000	1,220	555	460
31	470	.....	.....	385	.....	385	.....	795	.....	910	560	.....
1915–16.												
1	445	385	390	442	230	354	397	780	1,380	2,480	2,410	630
2	400	370	340	354	260	312	442	845	1,460	2,410	2,540	572
3	400	370	320	442	333	312	420	845	1,460	2,480	2,220	545
4	385	330	340	397	420	312	490	845	1,660	2,340	2,100	518
5	400	330	360	397	397	397	572	845	1,930	2,340	1,930	518
6	400	310	370	397	397	420	490	910	1,980	2,100	1,820	518
7	400	340	360	397	420	333	442	945	1,980	2,100	1,710	545
8	420	340	320	354	397	375	420	1,130	1,880	2,100	1,560	466
9	445	340	340	354	397	420	420	1,380	2,100	2,160	1,560	442
10	445	340	340	397	354	466	376	1,460	2,220	2,540	1,420	442
11	420	365	320	354	354	518	354	1,610	2,610	2,410	1,370	545
12	445	335	320	354	354	750	466	1,760	2,680	2,410	1,130	600
13	420	335	340	246	354	780	442	1,880	2,900	2,280	1,380	600
14	420	355	355	312	333	750	466	1,820	3,050	2,220	1,660	600
15	440	385	355	354	333	690	490	1,660	2,900	2,040	1,660	572
16	440	405	355	397	354	660	490	1,460	2,900	2,100	1,510	545
17	440	405	355	354	354	660	630	1,170	2,900	1,780	1,420	545
18	420	405	355	354	354	690	660	1,060	2,900	1,660	1,380	518
19	420	430	355	397	333	720	490	1,020	2,980	1,460	1,250	518
20	420	430	315	397	354	720	442	945	2,980	1,380	1,090	518
21	390	430	355	354	354	750	490	910	2,750	1,290	1,060	490
22	370	425	400	354	333	750	572	910	2,610	1,250	945	466
23	390	420	425	354	333	690	545	878	2,280	1,200	910	442
24	390	400	400	397	333	660	545	812	2,220	1,130	845	442
25	390	400	335	397	312	660	600	750	2,040	1,020	810	442
26	390	360	355	354	312	660	660	720	1,980	945	780	442
27	385	420	355	354	333	518	690	750	2,100	910	810	442
28	385	355	315	312	354	397	780	750	2,220	910	780	442
29	370	355	425	354	354	420	720	845	2,280	945	720	442
30	385	390	450	312	.....	420	780	945	2,410	1,710	690	442
31	385	.....	425	312	.....	397	.....	1,130	.....	2,340	690	.....

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Daily discharge, in second-feet, of Arkansas River at Canon City, Colo., for the years ending Sept. 30, 1914–1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1916-17.												
1	397	490	466	550	343	280	435	458	900	3,430	1,560	736
2	375	490	490	550	343	343	389	527	980	3,430	1,460	705
3	397	490	490	527	435	343	366	550	860	3,110	1,260	674
4	397	518	490	527	435	366	320	550	820	2,970	1,020	643
5	397	442	490	527	458	412	343	550	940	2,900	980	612
6	397	442	518	504	435	435	389	458	1,020	2,760	860	643
7	442	466	466	504	412	366	343	435	1,020	2,550	980	674
8	466	490	397	504	412	366	366	481	1,060	2,690	1,100	612
9	466	490	397	504	412	366	412	643	1,360	3,270	1,100	481
10	490	490	442	504	458	366	412	674	1,830	3,590	1,100	458
11	490	466	420	504	481	389	412	643	2,760	3,040	1,180	444
12	466	545	442	458	504	389	412	627	2,900	2,760	1,260	426
13	518	490	466	343	458	360	435	481	3,040	2,550	1,260	421
14	518	442	490	300	389	389	481	481	3,430	2,350	1,140	463
15	490	442	466	300	389	343	481	643	3,830	2,020	980	536
16	490	490	466	300	389	343	458	900	4,170	2,150	940	527
17	490	572	442	366	366	360	435	1,140	4,340	2,020	829	513
18	490	572	466	435	366	389	366	1,310	4,510	1,960	798	481
19	490	545	466	504	366	412	343	1,460	4,760	1,960	940	375
20	466	572	466	527	389	435	320	1,460	4,760	2,020	860	366
21	490	572	442	435	389	435	300	1,410	4,340	1,890	829	366
22	518	545	518	343	435	435	343	1,310	4,250	1,660	767	375
23	545	572	518	389	435	412	412	1,260	4,340	1,960	674	375
24	545	572	490	458	435	412	412	1,220	4,250	1,890	643	371
25	570	545	490	458	435	389	412	1,140	4,250	2,090	581	366
26	545	518	420	481	412	389	458	980	4,250	2,150	550	348
27	570	545	333	481	366	389	389	798	3,830	1,410	527	348
28	518	518	354	435	366	389	366	767	3,510	2,090	550	329
29	518	490	420	458	.....	458	366	705	3,590	1,890	674	329
30	490	466	490	458	.....	527	389	705	3,590	1,760	736	329
31	490	.....	518	458	.....	527	.....	705	.....	1,710	736	.....
1917-18.												
1	312	244	320	300	550	280	366	320	1,560	1,890	930	670
2	308	343	300	304	610	300	320	320	1,410	1,660	860	730
3	300	352	300	308	458	320	280	343	1,510	1,510	860	700
4	304	366	292	312	610	343	240	343	1,710	1,510	1,010	670
5	296	366	280	316	640	366	260	366	2,020	1,560	1,050	700
6	288	343	288	320	730	389	260	435	2,410	1,560	1,050	700
7	280	320	343	280	527	435	320	610	2,690	1,310	860	700
8	292	329	361	300	504	435	280	670	2,830	1,560	790	700
9	312	329	329	320	412	412	320	730	3,110	1,890	860	640
10	308	329	375	280	366	366	320	790	3,590	1,820	860	700
11	312	343	371	320	366	343	366	760	4,080	1,890	1,010	700
12	320	343	375	320	366	343	366	730	4,420	2,020	1,170	700
13	312	338	375	366	389	343	389	640	4,590	1,890	1,170	700
14	296	308	394	280	366	343	412	580	4,950	1,610	1,130	670
15	284	338	398	280	366	343	435	550	4,950	1,560	1,090	580
16	272	366	384	240	300	343	366	550	4,860	1,460	1,090	700
17	264	343	357	280	343	320	343	760	4,760	1,890	1,090	730
18	252	300	366	343	366	320	300	970	4,950	1,760	895	670
19	256	288	389	343	343	343	280	1,090	4,680	1,660	760	504
20	236	312	371	343	300	320	300	1,260	4,160	1,220	790	580
21	224	334	366	366	320	343	300	1,460	3,910	1,010	700	580
22	240	320	361	412	366	343	320	1,360	3,910	1,090	550	412
23	272	312	329	366	412	320	366	1,410	4,760	1,170	550	240
24	272	308	325	435	366	343	366	1,610	3,590	1,010	458	160
25	264	300	329	412	343	435	366	1,820	3,430	860	389	366
26	272	308	325	280	320	412	366	1,890	3,110	790	366	120
27	284	320	320	300	320	412	389	1,710	2,550	790	366	200
28	288	300	320	320	280	412	412	1,610	2,410	730	366	220
29	312	288	320	366	.....	412	343	1,660	2,080	730	366	343
30	320	288	308	366	.....	389	320	1,710	1,960	700	527	412
31	348	.....	300	435	.....	366	.....	1,660	.....	860	580	.....

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Daily discharge, in second-feet, of Arkansas River at Canon City, Colo., for the years ending Sept. 30, 1914–1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	435	550	412	318	398	350	1,140	1,140	2,360	1,650	1,380	480
2	504	458	412	310	398	358	1,040	1,010	2,120	1,830	1,600	360
3	458	527	412	390	390	370	1,080	925	1,900	2,420	1,380	380
4	366	670	412	440	358	382	925	880	1,650	2,850	1,250	689
5	458	550	412	490	358	350	1,030	864	1,550	2,530	1,130	425
6	458	458	412	490	410	350	1,100	840	1,480	2,160	995	360
7	369	412	412	440	382	318	692	880	1,370	2,200	844	352
8	280	412	412	490	422	342	545	898	1,420	1,900	1,830	340
9	320	412	412	530	422	330	492	952	1,370	1,730	905	340
10	320	366	412	490	455	310	650	898	1,370	1,610	796	640
11	366	412	412	555	480	318	531	864	1,350	1,500	745	675
12	366	458	366	530	430	330	629	786	1,390	1,320	654	745
13	389	380	412	610	390	358	650	786	1,460	1,060	626	626
14	435	389	366	580	370	342	552	800	1,650	1,140	570	780
15	458	412	412	480	310	318	685	816	1,830	1,320	510	820
16	435	366	412	530	330	310	594	1,020	1,900	1,240	498	820
17	389	389	458	580	370	310	566	1,060	1,960	1,320	796	796
18	458	389	412	565	390	342	636	1,320	1,830	1,110	745	745
19	389	389	412	570	430	410	952	1,390	2,120	1,040	654	654
20	389	412	412	520	358	480	970	1,820	2,090	1,100	640	640
21	481	435	412	480	370	555	898	2,570	2,020	1,070	605	605
22	458	412	412	455	330	530	840	2,710	2,060	887	654	654
23	412	435	366	440	350	520	880	2,640	2,020	773	640	640
24	366	400	366	470	342	470	988	2,500	1,900	661	605	605
25	412	366	366	430	350	422	1,060	2,390	1,030	591	510	510
26	481	458	320	410	350	406	988	2,710	2,020	682	540	540
27	412	435	320	422	390	390	970	2,810	1,770	796	510	510
28	389	435	320	370	350	455	1,000	2,950	1,690	968	522	522
29	458	412	320	358	.....	505	1,040	3,030	1,630	766	510	510
30	504	412	320	370	.....	580	1,390	2,850	1,590	1,010	450	450
31	481	.....	320	370	.....	854	.....	2,850	.....	1,230	450	.....
1919-20												
1	440	425	570	370	380	435	195	328	3,080	2,790	1,740	800
2	392	425	605	380	380	435	223	391	2,640	2,560	1,570	640
3	392	440	584	380	380	446	209	408	2,820	2,480	1,260	598
4	450	440	605	408	370	421	195	462	2,900	2,560	1,460	580
5	510	410	584	424	338	391	223	479	2,990	2,640	1,500	550
6	498	425	558	424	328	338	242	479	2,990	2,430	1,300	550
7	440	400	498	391	328	318	242	490	3,350	2,250	1,180	562
8	450	450	450	354	328	338	242	574	3,500	2,020	1,080	640
9	450	540	450	280	380	380	304	658	3,640	1,830	1,070	640
10	450	510	440	328	380	338	318	748	3,930	1,660	1,150	610
11	450	522	558	354	391	354	338	787	3,130	1,640	1,260	610
12	440	540	570	338	338	328	280	768	2,900	1,600	1,010	622
13	462	510	450	370	338	328	290	683	3,080	1,460	1,020	610
14	450	522	392	370	318	408	424	787	3,260	1,460	1,020	598
15	480	462	440	391	338	538	354	814	3,210	1,460	954	598
16	498	462	480	435	338	435	338	814	3,130	1,400	975	562
17	450	462	462	435	328	424	338	748	3,080	1,380	1,160	580
18	440	462	480	424	338	424	354	670	3,030	1,860	1,300	562
19	410	510	498	424	338	424	435	735	2,590	1,690	1,150	562
20	410	440	462	408	370	424	435	940	2,480	1,300	1,300	520
21	410	462	498	380	391	462	408	1,180	2,430	1,080	1,420	490
22	400	462	480	370	424	538	304	1,380	2,430	1,320	1,260	490
23	410	462	480	354	435	462	290	1,640	2,530	1,400	1,020	490
24	410	440	450	354	479	354	290	1,800	2,640	1,360	1,010	380
25	425	510	425	354	462	290	328	1,870	2,530	1,690	1,080	380
26	410	498	462	338	424	270	318	2,040	2,560	1,800	1,150	408
27	425	522	450	354	391	280	304	2,240	2,590	1,690	2,290	424
28	400	498	480	354	391	256	338	1,960	3,440	1,400	1,180	424
29	410	400	498	338	408	232	318	1,800	3,210	1,340	1,020	380
30	425	558	510	338	.....	223	318	2,210	2,960	1,380	996	380
31	450	.....	510	338	.....	223	.....	2,900	.....	1,400	940	.....

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Monthly discharge of Arkansas River at Canon City, Colo., for the years ending Sept. 30, 1914–1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1913–14.				
October	500	335	375	23,100
November	425	335	354	21,100
December	425	310	355	21,800
January	380	310	354	21,800
February	380	310	348	19,300
March	410	330	355	21,800
April	380	330	348	20,700
May	2,200	355	1,130	69,500
June	4,410	1,430	2,780	165,000
July	3,260	1,920	2,510	154,000
August	4,800	755	1,320	81,200
September	620	370	477	28,400
The year	4,800	310	891	648,000
1914–15.				
October	595	370	453	27,900
November	470	370	413	24,600
January	480	280	386	23,700
February	385	280	347	19,300
March	508	310	370	22,800
April	910	385	548	32,600
May	1,360	430	772	47,500
June	2,980	1,220	2,100	125,000
July	1,940	760	1,320	81,200
August	1,170	520	698	42,900
September	525	315	446	26,500
1915–16.				
October	445	370	408	25,100
November	430	310	375	22,300
December	450	315	360	22,100
January	442	246	365	22,400
February	420	230	348	20,000
March	780	312	547	33,600
April	780	354	526	31,300
May	1,880	720	1,090	67,000
June	3,050	1,380	2,320	138,000
July	2,540	910	1,820	112,000
August	2,540	690	1,360	83,600
September	630	442	508	30,200
The year	3,050	230	836	608,000
1916–17.				
October	570	375	482	29,600
November	572	442	509	30,300
December	518	333	459	28,200
January	500	300	455	28,000
February	504	343	411	22,800
March	527	280	394	24,200
April	481	300	392	23,300
May	1,460	435	822	50,500
June	4,760	829	2,980	177,000
July	3,590	1,410	2,390	147,000
August	1,560	527	931	57,200
September	736	329	478	28,400
The year	4,760	280	892	646,000
1917–18.				
October	320	224	287	17,100
November	366	244	323	19,200
December	398	280	341	21,000
January	435	240	329	20,200
February	730	280	416	23,100
March	435	280	361	22,200
April	435	240	336	20,000
May	1,890	320	991	60,900
June	4,950	1,410	3,360	200,000
July	2,020	700	1,390	85,500
August	1,170	366	792	48,700
September	730	120	550	32,700
The year	4,950	120	790	571,000

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Monthly discharge of Arkansas River at Canon City, Colo., for the years ending Sept. 30, 1914–1920—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	504	280	416	25,600
November	670	366	431	25,600
December	458	300	386	23,700
January	610	310	467	28,700
February	455	310	369	20,500
March	854	310	409	25,100
April	1,390	492	852	50,700
May	3,030	786	1,610	99,000
June	2,360	1,350	1,760	105,000
July	2,850	591	1,370	84,200
August	1,600	450	792	48,700
September	820	340	571	34,000
The year	3,030	280	789	571,000
1919–20.				
October	510	392	437	26,900
November	558	400	472	28,100
December	605	392	496	30,500
January	435	280	373	22,900
February	479	318	374	21,500
March	538	223	372	22,900
April	435	195	306	18,200
May	2,900	328	1,090	67,000
June	3,930	2,430	2,970	177,000
July	2,790	1,080	1,750	108,000
August	2,200	940	1,220	75,000
September	800	380	541	32,200
The year	3,930	195	867	630,000

ARKANSAS RIVER AT PUEBLO, COLO.

LOCATION.—150 feet below Main Street Bridge in Pueblo, Pueblo County. Nearest tributary, Fountain Creek, enters 2 miles below.

DRAINAGE AREA.—4,600 square miles.

RECORDS AVAILABLE.—May 1, 1885, to September 30, 1886; September 19, 1894, to September 30, 1920. From June 1 to September 30, 1887, and May 1 to August 31, 1889, station maintained at point 9 miles above Pueblo.

GAGE.—Bristol float-type water-stage recorder on right bank.

DISCHARGE MEASUREMENTS.—Made from Main Street Bridge.

CHANNEL AND CONTROL.—Bed composed of gravel and sand; shifting. No well defined control.

EXTREMES OF DISCHARGE.—1894–1920: Maximum daily mean discharge, 8,320 second-feet, on August 5, 1902; minimum discharge, 25 second-feet, on September 11, 1908.

ICE.—Stage-discharge relation slightly affected by ice.

DIVERSIONS.—Court decrees for diversion of 648 second-feet from Arkansas River between Pueblo and Canon City.

COOPERATION.—Complete records furnished by State engineer.

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Daily discharge, in second-feet, of Arkansas River at Pueblo, Colo., for the years ending Sept. 30, 1914–1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept
1913–14.												
1	350	280	300	395	345	375	360	1,590	3,440	1,640	5,300	720
2	428	225	325	395	345	390	345	1,300	3,960	1,930	3,740	790
3	428	350	400	395	345	390	360	980	4,200	2,120	6,720	720
4	428	428	428	395	345	390	408	895	3,900	2,480	4,610	625
5	375	428	455	395	345	390	408	718	3,500	2,870	3,740	595
6	400	400	455	395	360	390	465	625	3,020	2,480	2,810	595
7	350	400	455	395	330	375	465	565	2,720	3,220	2,480	665
8	325	400	455	378	330	390	490	565	2,110	2,120	2,240	588
9	400	400	455	360	360	390	465	595	1,950	1,930	2,030	595
10	350	325	400	360	360	390	425	685	1,690	1,640	2,100	595
11	325	300	350	330	360	390	425	895	1,860	1,640	1,770	490
12	400	300	350	300	360	375	465	1,160	2,790	2,060	1,480	440
13	375	242	400	300	360	375	490	980	2,870	2,400	1,480	440
14	375	280	350	300	355	375	515	838	3,220	4,700	1,260	540
15	400	300	350	320	355	375	490	895	4,000	2,330	990	515
16	375	300	375	320	360	390	465	1,250	6,060	2,120	870	490
17	375	300	428	320	350	390	465	1,250	4,860	3,480	830	490
18	350	300	455	340	350	408	515	1,390	4,260	3,220	720	490
19	375	260	485	340	340	425	515	1,250	3,920	3,830	625	440
20	350	300	485	360	340	408	490	1,250	3,660	3,830	720	440
21	350	280	428	330	335	390	445	1,440	3,660	3,390	720	440
22	350	300	350	315	395	375	465	2,060	3,390	3,390	790	395
23	350	300	350	330	395	360	490	2,270	3,040	4,610	950	440
24	350	280	400	345	335	375	465	2,320	2,710	3,220	910	440
25	375	280	350	330	350	390	465	2,490	3,040	2,790	1,030	395
26	350	300	350	330	330	390	408	2,110	2,870	2,870	1,030	395
27	350	300	325	345	355	375	465	1,950	2,400	3,040	1,080	395
28	300	300	325	345	355	375	465	2,380	2,260	5,130	1,030	378
29	260	280	300	360	.....	375	465	2,380	1,860	4,700	950	360
30	300	300	300	330	.....	375	895	1,950	1,750	4,180	910	395
31	260	.....	300	315	.....	390	.....	2,220	.....	6,470	870	.....
1914–15.												
1	395	528	.....	590	402	358	425	955	1,170	1,820	875	398
2	395	450	.....	590	402	380	402	955	1,980	1,820	730	330
3	418	450	.....	590	425	380	402	838	2,260	1,600	595	295
4	418	450	.....	590	380	402	402	660	2,080	1,600	628	420
5	440	450	.....	590	402	380	450	695	1,860	1,490	695	420
6	465	428	.....	590	358	335	475	875	1,760	1,490	628	420
7	465	405	.....	530	358	335	590	875	1,650	1,440	800	420
8	490	385	.....	560	380	380	655	998	1,450	1,290	765	415
9	418	365	.....	530	425	402	790	955	1,310	1,150	1,040	380
10	440	385	.....	530	380	380	655	800	1,310	1,230	1,040	395
11	540	475	.....	530	380	380	530	695	1,500	1,230	875	340
12	515	450	.....	530	402	380	530	595	2,490	1,130	1,080	330
13	490	450	.....	530	425	380	530	628	3,020	1,130	765	325
14	540	450	.....	475	380	335	530	838	2,140	1,210	660	348
15	540	450	.....	475	335	335	530	1,120	1,810	1,790	595	348
16	470	450	.....	475	335	335	755	1,120	1,650	1,150	628	370
17	470	450	.....	425	335	335	1,150	1,120	1,650	1,150	2,430	370
18	470	450	.....	425	335	335	1,620	1,220	1,920	1,050	1,760	302
19	520	500	.....	402	358	358	1,220	1,360	2,030	1,000	1,550	348
20	520	450	.....	335	335	425	915	1,310	2,370	920	1,220	420
21	550	450	.....	530	335	335	800	1,260	2,620	1,080	890	395
22	550	450	.....	530	380	295	838	1,080	2,750	990	720	395
23	600	450	.....	475	358	335	1,120	915	3,240	860	960	370
24	760	428	.....	425	295	402	1,220	800	3,370	1,380	1,080	348
25	660	428	.....	450	358	590	1,120	800	3,190	1,150	890	1,080
26	750	385	.....	425	335	622	915	800	3,110	1,600	785	670
27	790	365	.....	475	335	655	730	875	2,970	1,400	682	650
28	660	405	.....	530	335	590	800	838	2,510	2,950	530	530
29	620	385	.....	450	.....	622	730	765	2,260	1,760	470	510
30	620	365	.....	502	.....	560	875	730	2,040	1,120	445	520
31	535	.....	.....	425	.....	475	.....	875	.....	955	420	.....

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Daily discharge, in second-feet, of Arkansas River at Pueblo, Colo., for the years ending Sept. 30, 1914–1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915–16.												
1	560	345	450	465	170	220	360	1,070	1,300	2,130	2,120	310
2	530	342	400	430	272	245	360	1,070	1,490	2,220	2,120	310
3	530	340	425	465	430	195	395	980	1,540	2,270	2,060	250
4	470	337	425	500	465	245	430	1,120	1,740	2,210	1,920	250
5	515	330	440	500	465	300	430	1,200	1,790	2,100	1,980	225
6	515	332	430	500	465	360	465	1,200	1,790	1,940	1,830	200
7	485	335	430	500	465	330	430	1,200	1,840	1,830	1,760	178
8	510	350	390	465	500	300	395	1,120	1,890	1,980	1,670	200
9	530	355	360	465	465	330	360	1,200	1,940	2,080	1,560	370
10	530	360	360	500	465	330	330	1,440	2,140	2,340	1,410	340
11	495	337	358	465	360	395	300	1,590	2,250	2,390	1,140	340
12	490	337	328	360	360	465	300	1,590	2,520	2,240	1,190	462
13	490	340	330	300	330	735	330	1,690	2,640	2,100	1,550	430
14	550	340	332	360	300	815	395	1,790	2,640	2,200	1,460	430
15	570	430	370	430	300	735	430	1,640	2,640	1,990	1,690	462
16	570	430	368	395	300	655	395	1,490	2,520	1,830	1,460	462
17	535	490	419	395	330	655	430	1,200	2,640	1,630	1,280	430
18	535	463	420	430	360	655	535	1,120	2,640	1,620	1,100	430
19	538	490	417	465	300	695	430	1,120	2,640	1,480	1,010	430
20	540	530	415	430	300	695	430	1,070	2,580	1,280	890	400
21	542	530	413	430	272	735	395	1,020	2,520	1,230	850	370
22	478	505	410	395	272	735	395	980	2,270	1,230	810	370
23	480	420	490	330	272	695	430	980	2,170	1,230	560	370
24	482	420	438	330	272	695	465	855	2,010	1,100	595	370
25	460	420	435	330	195	655	500	735	1,850	925	560	370
26	440	395	432	330	195	655	615	695	1,800	840	665	370
27	442	370	460	330	220	615	615	655	1,790	800	735	340
28	390	370	380	330	195	395	695	695	1,880	840	528	340
29	392	370	405	300	220	300	895	775	1,930	840	430	340
30	395	410	458	330	.....	330	1,070	855	2,020	1,070	370	370
31	370	.....	455	330	.....	395	.....	938	.....	2,120	340	.....
1916–17.												
1	370	495	.....	478	340	265	340	315	1,180	3,020	1,690	671
2	310	495	.....	478	315	265	315	360	1,280	2,940	1,470	638
3	280	495	.....	450	395	240	265	450	1,280	2,620	1,320	612
4	280	462	.....	423	395	265	240	423	1,100	2,330	1,130	671
5	310	430	.....	450	368	265	240	340	1,180	2,190	1,080	612
6	310	400	.....	423	395	240	240	368	1,230	2,090	1,210	632
7	280	430	.....	423	368	240	265	368	1,180	1,940	897	657
8	310	400	.....	368	395	217	217	395	1,180	2,000	946	618
9	430	400	.....	368	423	265	240	450	1,280	2,920	946	472
10	495	400	.....	423	368	265	290	592	1,780	4,080	960	423
11	495	400	.....	450	340	240	340	625	2,410	3,100	1,050	395
12	495	430	.....	450	340	240	423	533	2,480	2,610	1,150	340
13	495	560	.....	368	368	240	450	450	2,550	2,350	1,250	315
14	495	528	.....	265	340	240	450	423	3,000	1,980	1,180	395
15	495	495	.....	217	368	240	450	450	3,320	1,840	987	483
16	528	495	.....	128	395	240	423	533	3,570	1,780	890	362
17	430	528	.....	217	368	217	290	690	4,120	1,890	996	362
18	430	460	.....	395	315	217	217	925	4,400	1,770	1,310	357
19	430	528	.....	505	315	265	217	1,230	4,690	1,760	946	260
20	430	560	.....	505	315	290	217	1,280	4,600	1,850	960	461
21	430	560	.....	450	315	290	172	1,140	4,400	1,830	827	434
22	462	528	.....	340	315	315	150	1,100	3,930	1,560	742	423
23	528	495	.....	315	315	368	195	1,050	3,840	1,470	625	401
24	595	528	.....	340	315	315	315	1,000	3,840	1,830	586	379
25	595	495	.....	395	368	290	290	1,100	3,740	1,770	527	320
26	560	462	.....	450	423	265	265	1,000	3,840	1,840	483	395
27	560	430	.....	478	315	240	265	855	3,320	2,550	472	401
28	528	400	.....	450	265	217	240	820	3,240	1,940	516	401
29	495	400	.....	423	.....	315	265	750	3,100	1,880	544	357
30	528	370	.....	423	.....	450	290	750	2,950	1,910	632	325
31	528	.....	.....	368	.....	368	.....	925	.....	1,920	657	.....

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Daily discharge, in second-feet, of Arkansas River at Pueblo, Colo., for the years ending Sept. 30, 1914–1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Spet.
1917–18.												
1	335	401	245	196	140	190	330	270	1,300	1,440	270	300
2	305	406	320	218	240	240	270	215	1,360	1,240	270	240
3	305	434	305	240	215	240	125	240	1,370	1,090	270	240
4	305	406	270	223	360	190	125	240	1,380	1,090	480	270
5	280	384	245	206	450	190	125	270	1,600	1,340	700	550
6	255	373	235	190	420	240	190	390	1,760	1,440	585	620
7	235	390	222	190	480	190	165	480	2,530	1,340	480	450
8	362	346	315	190	330	240	165	620	2,350	1,440	480	330
9	390	384	320	190	215	165	190	550	2,420	1,340	550	360
10	351	295	325	190	190	100	125	550	2,690	1,650	450	270
11	330	260	333	190	190	100	165	550	3,260	2,520	450	420
12	340	295	338	190	165	90	190	660	3,520	1,760	480	620
13	330	305	345	190	140	90	190	620	4,320	1,240	450	585
14	320	315	350	330	90	90	300	450	4,500	1,140	860	480
15	357	280	355	480	64	190	390	420	4,320	1,140	620	420
16	325	300	362	300	42	190	270	390	3,960	950	550	420
17	320	384	310	300	72	215	190	420	4,320	1,240	550	420
18	315	335	275	420	165	165	125	636	4,320	995	420	390
19	346	305	275	480	90	190	100	788	4,050	1,040	300	360
20	325	280	260	330	90	140	140	852	3,600	905	190	360
21	315	275	231	360	190	140	165	1,160	3,430	905	140	360
22	335	260	235	240	240	190	140	1,140	4,320	950	125	300
23	346	280	209	300	190	215	190	1,180	6,380	860	110	270
24	270	260	150	480	165	190	215	1,310	3,600	860	110	215
25	270	255	141	620	90	240	300	1,390	3,100	585	100	215
26	290	275	164	480	90	330	300	1,490	2,660	550	90	215
27	290	300	200	300	56	300	330	1,620	2,180	480	81	240
28	290	325	132	190	140	215	390	1,420	2,000	480	49	240
29	395	295	128	300	.....	300	360	1,380	1,760	360	56	190
30	411	270	177	190	.....	300	300	1,330	1,540	420	140	165
31	373	.....	173	110	.....	215	.....	1,340	.....	360	300	.....
1918–19.												
1	190	270	215	198	279	244	1,150	1,440	2,250	1,530	1,230	314
2	190	240	270	200	286	272	1,080	1,280	1,980	1,320	1,430	179
3	190	270	215	200	286	286	1,110	1,170	1,850	1,320	1,430	78
4	190	240	200	250	300	300	1,210	1,150	1,710	1,930	1,470	1,620
5	240	240	200	300	251	300	1,280	1,040	1,550	2,250	1,130	258
6	270	215	200	300	230	300	1,330	914	1,410	2,430	1,060	258
7	140	240	200	300	272	230	860	1,910	1,470	1,830	950	204
8	125	270	190	325	286	230	286	950	1,530	1,670	1,930	223
9	125	240	190	350	272	244	610	941	1,590	1,650	1,880	160
10	110	240	230	375	314	230	578	905	1,550	1,630	730	410
11	125	300	200	400	356	179	474	869	1,310	1,550	682	941
12	110	300	190	425	363	179	506	754	1,210	1,490	690	714
13	110	300	200	450	300	198	674	706	1,270	1,210	570	634
14	190	270	230	475	265	198	815	706	1,410	1,250	450	932
15	190	270	190	500	244	198	754	754	1,540	1,450	418	1,460
16	165	270	230	514	230	166	514	842	1,610	1,230	418	842
17	165	215	230	546	244	142	426	914	1,730	1,410	426	754
18	215	240	252	514	265	130	426	1,060	1,810	1,280	666	842
19	240	230	230	482	363	148	530	1,370	1,850	1,180	674	674
20	240	240	200	570	363	265	626	1,630	1,880	1,210	714	650
21	240	140	240	514	293	410	674	1,770	1,850	1,160	714	586
22	240	165	230	466	286	490	642	2,050	1,850	1,080	642	586
23	240	190	215	498	286	402	610	2,140	1,750	1,000	602	626
24	215	240	240	498	328	418	779	2,050	1,750	878	602	546
25	240	252	190	418	328	349	1,080	2,140	1,750	815	530	466
26	240	252	150	370	286	307	1,230	2,250	2,010	1,130	466	426
27	270	240	140	370	272	286	1,300	2,420	2,370	995	410	450
28	300	240	140	370	244	314	1,300	2,490	1,710	1,640	386	498
29	240	270	140	342	.....	230	1,220	2,780	1,530	1,230	378	450
30	240	240	140	314	.....	349	1,380	2,820	1,430	1,090	321	418
31	240	.....	140	286	.....	833	.....	2,550	.....	1,430	307	.....

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Daily discharge, in second-feet, of Arkansas River at Pueblo, Colo., for the years ending Sept. 30, 1914–1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	394	356	498	325	315	184	184	219	2,510	2,330	1,990	814
2	363	356	442	336	315	184	193	275	2,690	2,250	3,080	690
3	342	474	418	300	285	165	206	300	2,270	2,150	1,170	464
4	363	434	522	325	285	165	154	285	2,670	2,150	1,700	493
5	458	434	514	325	275	154	146	315	2,590	2,250	1,500	389
6	458	434	554	336	275	165	176	325	2,670	2,090	1,150	434
7	458	434	514	336	285	167	193	434	2,720	1,890	931	726
8	458	426	328	352	285	169	193	464	2,980	1,650	853	726
9	458	506	179	336	285	172	165	505	3,110	1,450	822	690
10	378	586	410	378	315	174	146	726	3,240	1,280	762	635
11	450	626	418	367	300	176	285	726	2,820	1,190	979	656
12	450	506	706	378	285	165	300	656	2,330	1,220	996	656
13	335	586	272	352	252	165	252	621	2,470	1,080	1,100	608
14	370	506	211	367	228	266	176	656	2,820	1,260	1,030	588
15	370	458	328	352	266	406	300	690	2,690	1,430	1,050	555
16	490	498	450	336	252	367	228	726	2,690	1,370	1,100	524
17	530	482	426	336	219	300	252	726	2,920	1,320	1,150	524
18	450	498	570	378	219	300	237	588	2,950	2,640	1,170	524
19	450	498	610	352	266	325	252	588	2,570	1,610	1,190	524
20	370	498	586	315	184	300	352	762	2,150	845	2,690	493
21	363	498	538	300	165	378	378	1,080	2,090	621	2,110	423
22	363	356	586	300	206	389	206	1,300	2,090	1,120	1,260	423
23	328	300	530	315	228	446	193	1,550	2,210	1,170	915	406
24	363	300	514	275	237	315	176	1,600	2,210	1,450	995	367
25	402	355	538	336	237	275	193	1,550	2,210	1,650	1,150	352
26	402	410	482	300	219	237	285	1,740	2,400	1,450	1,040	378
27	402	474	482	300	193	219	275	2,150	2,150	1,170	1,070	378
28	442	335	482	315	184	206	275	2,040	2,510	1,170	1,120	378
29	402	135	482	300	206	184	285	1,700	2,820	1,010	1,060	378
30	363	530	522	300	.....	154	228	1,890	2,490	995	995	378
31	328	.....	498	275	.....	154	.....	2,210	.....	1,150	876	.....

Monthly discharge of Arkansas River at Pueblo, Colo., for the years ending Sept. 30, 1914–1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1913-14.				
October	428	260	359	22,100
November	428	225	315	18,700
December	485	300	385	23,700
January	395	300	347	21,300
February	395	330	352	19,500
March	425	360	386	23,700
April	895	345	468	27,800
May	2,490	565	1,400	86,100
June	6,060	1,690	3,170	189,000
July	6,470	1,640	3,090	190,000
August	6,720	625	1,830	113,000
September	790	360	509	30,300
The year	6,720	225	1,050	765,000
1914-15.				
October	790	395	536	33,000
November	528	365	418	24,900
January	590	335	500	30,700
February	425	295	367	20,400
March	655	295	413	25,400
April	1,620	402	757	45,000
May	1,360	595	915	56,300
June	3,370	1,170	2,180	130,000
July	2,950	860	1,350	83,000
August	2,430	420	877	53,900
September	1,080	302	429	25,500

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Monthly discharge of Arkansas River at Pueblo, Colo., for the years ending Sept. 30, 1914–1920—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915–16.				
October	570	370	499	30,700
November	530	330	394	23,400
December	490	328	408	25,100
January	500	330	406	25,000
February	500	170	328	18,900
March	815	195	502	30,900
April	1,070	300	467	27,800
May	1,790	655	1,130	69,500
June	2,640	1,300	2,110	126,000
July	2,390	800	1,680	103,000
August	2,120	340	1,210	74,400
September	462	178	351	20,900
The year	2,640	170	790	576,000
1916–17.				
October	595	280	449	27,600
November	560	370	469	27,900
January	505	128	394	24,200
February	423	265	352	19,600
March	450	217	271	16,700
April	450	150	286	17,000
May	1,280	315	700	43,000
June	4,690	1,100	2,790	166,000
July	4,080	1,470	2,180	134,000
August	1,690	472	931	57,200
September	671	261	452	26,900
1917–18.				
October	411	235	323	19,900
November	434	255	322	19,200
December	362	128	256	15,700
January	620	110	284	17,500
February	480	42	190	10,600
March	330	90	196	12,100
April	390	100	219	13,000
May	1,620	215	786	48,300
June	6,380	1,300	3,000	179,000
July	2,520	360	1,070	65,800
August	860	49	345	21,200
September	620	165	350	20,800
The year	6,380	42	612	443,000
1918–19.				
October	270	110	201	12,400
November	300	140	244	14,500
December	270	140	201	12,400
January	570	198	391	24,000
February	363	230	289	16,000
March	833	130	285	17,500
April	1,380	286	848	50,500
May	2,820	706	1,510	92,800
June	2,250	1,210	1,680	100,000
July	2,430	815	1,400	86,100
August	1,930	307	784	48,200
September	1,620	78	573	35,200
The year	2,820	78	702	510,000
1919–20.				
October	530	328	405	24,900
November	626	136	430	25,600
December	610	179	472	29,000
January	378	275	329	20,200
February	315	165	251	14,400
March	446	154	240	14,800
April	378	146	229	13,600
May	2,210	219	948	58,300
June	3,240	2,090	2,570	153,000
July	2,640	621	1,500	92,200
August	3,080	762	1,260	77,500
September	814	352	519	30,900
The year	3,240	136	763	554,0[illegible]

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TENNESSEE FORK NEAR LEADVILLE, COLO.

LOCATION.—In sec. 16, T. 9 S., R. 80 W., at highway bridge a few hundred yards above junction with East Fork and 3 miles northwest of Leadville, Lake County.

DRAINAGE AREA.—45 square miles (measured on topographic map).

RECORDS AVAILABLE.—May 10 to October 31, 1890; June 18 to October 16, 1903; February 8, 1911, to September 30, 1920.

GAGE.—Vertical staff on downstream side of left bridge abutment: read by Fred Coquoz during summer and by forest ranger during winter. Datum lowered 0.40 foot October 6, 1911. Relation between present gage and gages used in 1890 and 1903 not known.

DISCHARGE MEASUREMENTS.—Made by wading or from bridge.

CHANNEL AND CONTROL.—Bed rough and composed of small boulders. Control a short distance below gage at rapids, which shifts slightly at long intervals. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 1.10 feet August 1 (discharge, 149 second-feet); no record during period of highest discharge; minimum stage, 0.25 foot March 27 (discharge, 4 second-feet).

Maximum stage recorded during year ending September 30, 1920, 2.0 feet at 10 a. m. May 26 and 27 (discharge, 430 second-feet); minimum discharge occurred during winter.

1911-1920: Maximum discharge recorded, 448 second-feet at 8 a. m. May 24, 1914; minimum discharge measured 1.3 second-feet on January 14, 1915.

ICE.—Stage-discharge relation seriously affected by ice.

DIVERSIONS.—Court decrees for diversions of 8 second-feet above the station; also a decree for diversions of 18.5 second-feet from the basin of Eagle River through Ewing ditch to that of Tennessee Fork above station. During 1919, 1,830 acre-feet, and during 1920, 2,000 acre-feet were diverted.

ACCURACY.—Stage-discharge relation shifted slightly. Rating curve well defined between 8 and 250 second-feet; applied indirectly for shifting control from July 1, 1919, to August 15, 1920. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Tennessee Fork near Leadville, Colo., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 4	T. J. Watkins	0.35	8.8	June 18	Robert Follansbee	1.12	124
Feb. 18	do	[a] .42	8.8	July 22	P. V. Hodges	.75	47.6
July 22	Robert Follansbee	.43	17.0				
Nov. 1	T. J. Watkins	.58	21.8				

[a] Stage-discharge relation affected by ice.

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Daily discharge, in second-feet, of Tennessee Fork near Leadville, Colo., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	11	15							88	60	149	11
2	11	15							100	81	135	13
3	11	15							100	90	117	10
4	11	15		9					66	73	102	13
5	6.2	15							62	50	66	11
6	9.8	14						100	62	50	50	10
7	8.6	14							54	46	38	10
8	8.0	14							58	41	36	10
9	8.0	14		11					70	36	36	10
10	8.0	14							84	33	27	15
11	6.2	14						88	100	52	23	17
12	6.2	14				8	8		86	43	23	21
13	6.2	12							79	38	23	21
14	6.2	12							77	35	23	18
15	6.2	12							84	32	18	17
16	6.2	12						112	77	29	14	16
17	8.0	10					24		79	58	14	16
18	8.0	10			9	5			75	56	14	18
19	9.8	10							70	35	14	17
20	9.8	10							66	29	14	16
21	11	9					100		66	22	14	16
22	11	9							62	18	14	14
23	11	9							56	16	14	14
24	11	9				8			48	14	13	13
25	11	9							56	14	11	11
26	11	8							50	17	10	10
27	11	8				4			46	18	10	10
28	11	8					66		50	19	10	9
29	11	8							46	27	10	10
30	11	8							46	36	10	10
31	11					5				41	10	
1919–20.												
1	9	22						19	318	100	41	14
2	10								266	96	44	12
3	10								283	95	43	15
4	10								250	90	52	19
5	13								250	81	35	11
6	14								250	77	44	13
7	14								266	72	38	14
8	13								250	60	26	18
9	13							120	218	73	32	22
10	14								203	58	41	13
11	14								218	60	35	17
12	13								266	64	28	19
13	11								250	54	23	18
14	10								234	46	20	17
15	13							117	218	41	13	11
16	13								188	52	21	18
17	13								188	48	14	14
18	14								115	46	19	13
19	14								107	52	22	16
20	14								110	50	26	15
21	13								105	52	50	17
22	13								105	36	35	24
23	14								102	27	27	15
24	13								95	43	19	17
25	13							370	93	84	14	15
26	14							370	100	160	19	12
27	23							370	95	68	27	14
28	23							266	84	41	19	10
29	23							300	79	43	35	16
30	14							300	73	36	21	19
31	14							283		29	11	

NOTE.—Stage-discharge relation affected by ice Nov. 5–30, 1918; discharge determined from temperature and gage-height records.

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Monthly discharge of Tennessee Fork near Leadville, Colo., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	11	6.2	9.24	568
November	15	8	11.5	684
June	100	46	68.8	4,090
July	90	14	39.6	2,430
August	149	10	34.3	2,110
September	21	9	13.6	809
1919–20.				
October	23	9	13.7	842
June	318	73	179	10,700
July	160	27	62.5	3,840
August	52	11	28.8	1,770
September	24	10	15.6	928

COTTONWOOD CREEK BELOW HOT SPRINGS, NEAR BUENA VISTA, COLO.

LOCATION.—In sec. 22, T. 14 S., R. 79 W., half a mile below old Hot Springs Hotel and 6 miles west of Buena Vista, Chaffee County.

DRAINAGE AREA.—69 square miles (measured on Hayden atlas).

RECORDS AVAILABLE.—April 7, 1911, to September 30, 1920. From September 23, 1910, to September 13, 1911, a station was maintained in sec. 21, 1 mile above present site. Flow at two sites comparable.

GAGE.—Vertical staff; read by E. D. Masters. On February 19, 1915, gage was moved from side of left abutment to downstream end and reset to same datum. In present position water does not pile up on gage, especially during high water, and therefore for same discharge gage height will be less.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of boulders; very rough. Control short distance below gage; shifts at long intervals. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 1.65 feet at 6 a. m., May 27, 28, 29, and 30 (discharge, 240 second-feet); minimum stage recorded, 0.30 foot at 6 a. m. April 10 (discharge, 20 second-feet).

Maximum stage recorded during year ending September 30, 1920, 1.9 feet at 6 a. m. June 12 (discharge, 342 second-feet); minimum stage, 0.25 foot, April 21 and 22 (discharge, 19 second-feet).

1911–1920: Maximum stage recorded, 2.2 feet at 6 a. m. June 18, 1917 (discharge, 467 second-feet); minimum discharge, 10 second-feet April 9 and 19, 1914.

ICE.—Stage-discharge relation not affected by ice; hot springs keep creek open.

DIVERSIONS.—Court decrees for diversions of 148 second-feet from Cottonwood Creek, of which 28 second-feet are above gaging station.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Cottonwood Creek below Hot Springs, near Buena Vista, Colo., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 5	T. J. Watkins	0.48	25.2	July 23	P. V. Hodges	1.15	102
May 26	J. B. Spiegel	1.50	193				
Nov. 2	T. J. Watkins	.50	26.5				

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Daily discharge, in second-feet, of Cottonwood Creek below Hot Springs, near Buena Vista, Colo., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	38	32	26	26	22	22	22	36	122	134	60	34
2	36	31	27	26	23	22	21	37	100	156	60	31
3	35	31	27	26	23	22	21	31	89	207	60	31
4	34	31	26	26	23	22	22	32	89	177	56	31
5	34	31	27	24	22	22	22	34	89	140	51	31
6	34	31	27	24	22	21	22	39	89	122	47	38
7	35	31	26	24	22	21	21	42	122	129	44	32
8	35	28	26	24	22	22	21	42	115	106	49	32
9	34	31	26	24	22	22	22	42	110	106	49	32
10	36	31	26	24	22	21	21	42	122	86	40	38
11	35	31	25	24	22	22	21	39	148	76	48	34
12	34	31	25	25	22	22	22	39	177	73	45	35
13	34	31	26	24	22	22	22	39	177	73	44	36
14	34	30	25	24	22	22	22	51	177	81	41	44
15	32	30	26	24	21	22	21	63	186	73	39	51
16	32	27	26	24	22	22	21	63	192	73	38	42
17	32	27	27	25	22	22	21	76	207	66	38	38
18	37	27	27	25	22	22	23	89	207	63	38	36
19	37	27	26	25	22	22	25	115	207	63	36	36
20	34	27	26	25	22	22	26	177	207	60	36	36
21	34	27	26	24	22	22	27	198	192	60	35	35
22	34	27	26	23	22	22	34	198	162	60	34	32
23	32	27	26	24	22	21	37	156	162	56	33	32
24	32	28	26	24	22	22	42	129	162	53	32	32
25	32	27	25	24	22	21	42	148	140	53	35	31
26	31	27	25	24	22	21	38	207	140	49	34	31
27	28	27	25	24	22	21	38	216	140	50	34	31
28	31	27	26	24	22	21	32	222	162	49	34	31
29	32	27	26	24	.....	21	31	216	148	60	33	31
30	31	27	26	24	.....	21	34	222	148	60	31	30
31	31	.....	26	23	.....	22	.....	207	.....	60	31	.....
1919-20.												
1	30	30	27	24	23	22	30	22	222	229	73	52
2	28	26	27	24	23	22	20	22	192	229	73	52
3	30	26	27	24	22	22	20	24	192	216	73	54
4	30	26	26	24	22	22	21	24	198	216	72	54
5	31	28	26	24	22	22	21	26	207	207	70	54
6	31	27	27	24	22	22	21	26	198	198	68	52
7	32	27	27	24	22	22	21	28	257	186	63	49
8	32	27	26	24	22	22	21	32	320	186	60	47
9	31	26	26	24	22	22	21	40	320	168	60	45
10	31	25	27	24	22	22	21	41	297	168	58	44
11	30	26	26	24	22	22	21	37	277	168	57	40
12	31	26	26	24	22	22	21	33	277	168	54	40
13	31	26	26	24	22	22	21	36	257	156	52	40
14	32	26	27	24	22	22	21	34	257	145	50	38
15	32	26	26	24	22	20	21	31	257	148	49	38
16	32	27	26	23	22	22	21	29	250	148	49	37
17	32	27	26	24	22	22	20	32	277	148	51	35
18	32	27	26	24	22	22	20	44	240	124	51	34
19	32	27	25	24	22	21	20	70	222	115	49	34
20	30	27	25	23	22	22	20	89	216	110	52	34
21	31	27	26	23	22	22	19	106	222	110	58	36
22	31	26	26	23	22	22	19	115	240	106	60	36
23	30	26	26	23	22	22	21	89	257	93	60	36
24	30	27	25	23	22	21	21	115	250	106	58	36
25	30	27	25	23	22	21	21	168	250	100	57	36
26	30	28	25	23	22	21	20	148	216	134	57	38
27	31	26	25	23	22	21	20	110	257	106	56	38
28	25	28	25	23	22	21	20	122	297	97	54	37
29	29	26	25	23	22	21	20	140	277	97	54	37
30	31	26	24	23	.....	21	21	186	257	93	54	36
31	29	.....	24	23	.....	21	.....	216	.....	89	52	.....

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Monthly discharge of Cottonwood Creek below Hot Springs, near Buena Vista, Colo., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	38	28	33.5	2,060
November	32	27	28.9	1,720
December	27	25	26.0	1,600
January	26	23	24.4	1,500
February	23	21	22.1	1,230
March	22	21	21.7	1,330
April	42	21	26.5	1,580
May	222	31	105	6,460
June	207	89	150	8,930
July	207	49	86.3	5,310
August	60	31	41.7	2,560
September	51	30	34.5	2,050
The year	222	21	50.1	36,300
1919–20.				
October	32	25	30.5	1,880
November	30	25	26.7	1,590
December	27	24	25.8	1,590
January	24	23	23.6	1,450
February	23	22	22.1	1,270
March	22	20	21.6	1,330
April	21	19	20.5	1,220
May	216	22	72.1	4,430
June	320	192	249	14,800
July	229	89	147	9,040
August	73	49	58.2	3,580
September	54	34	41.3	2,460
The year	320	19	61.5	44,600

CHALK CREEK (UPPER STATION) NEAR ST. ELMO, COLO.

LOCATION.—In sec. 27, T. 15 S., R. 80 W., a quarter of a mile below power plant of Tin Cup Gold Dredging Co. and 1¼ miles below St. Elmo, Chaffee County. Nearest tributary, Coal Creek, enters a quarter of a mile below.

DRAINAGE AREA.—48 square miles (measured on Forest Service atlas).

RECORDS AVAILABLE.—November 15, 1913, to September 30, 1919, when station was discontinued.

GAGE.—Friez water-stage recorder on left bank.

DISCHARGE MEASUREMENTS.—Made from footbridge near gage or by wading.

CHANNEL AND CONTROL.—Bed composed of coarse gravel. Banks not subject to overflow. Control at small rapids a short distance below gage; permanent during 1919.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 2.65 feet at 8 p. m. May 29 (discharge, 350 second-feet); minimum stage, 0.85 foot February 14 and March 6–11 (discharge, 8.5 second-feet).

ICE.—Stage-discharge relation not seriously affected by ice except for occasional short periods.

DIVERSIONS.—There are no court decrees for diversions of water that is not returned to the stream above the station. Below there are decrees for diversions of 133 second-feet from Chalk Creek.

REGULATION.—Low-water flow regulated to a certain extent by a small reservoir at St. Elmo, formed by the diversion dam for the Tin Cup Gold Dredging Co.'s power house (not used during 1919).

ACCURACY.—Stage-discharge relation permanent, except as affected by ice November 26–29, and December 26 to January 11. Rating curve well defined between 10 and 300 second-feet. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph. Records good.

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The following discharge measurement was made by T. J. Watkins:

January 6, 1919: Gage height, 0.98 foot; discharge, 12.0 second-feet (stage-discharge relation affected by ice).

Daily discharge, in second-feet, of Chalk Creek (upper station) near St. Elmo, Colo., for the year ending Sept. 30, 1919.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	28	20	17	10	9.4	8.8	11	40	120	106	98	21
2	28	21	16	10	9.4	8.8	12	40	102	164	123	22
3	27	20	16	11	9.4	8.8	15	37	98	185	116	21
4	26	20	16	11	9.4	8.8	11	40	100	150	90	21
5	25	19	16	12	9.4	8.8	11	46	100	130	75	24
6	24	19	16	12	9.4	8.5	12	52	118	113	65	25
7	24	20	14	12	9.4	8.5	14	57	142	100	65	26
8	24	20	13	11	9.4	8.5	12	60	135	90	65	24
9	27	20	13	10	9.4	8.5	12	61	130	81	58	24
10	28	17	13	10	9.1	8.5	13	53	150	72	54	25
11	27	17	13	10	9.1	8.5	11	50	158	67	47	27
12	25	16	13	9.4	8.8	9.4	10	54	179	64	43	25
13	23	16	12	9.4	8.8	9.7	9	68	188	81	40	29
14	23	16	13	9.4	8.5	13	9	94	209	81	37	41
15	22	16	13	9.7	8.8	10	12	111	200	68	34	33
16	23	17	12	9.7	9.1	14	13	120	200	65	33	28
17	25	19	12	10	9.1	14	13	145	194	65	31	27
18	26	16	12	10	9.1	31	14	164	185	65	31	28
19	26	16	12	10	9.1	31	19	206	179	72	31	28
20	26	16	12	9.4	9.1	19	23	233	161	65	30	26
21	26	15	12	9.1	9.1	18	30	251	140	57	29	24
22	25	14	12	9.1	9.1	16	33	227	130	52	27	23
23	24	16	12	9.1	9.1	15	38	179	123	47	26	23
24	24	17	13	9.1	9.1	14	36	161	118	46	26	22
25	26	18	13	9.4	9.1	14	31	212	113	53	33	21
26	23	15	11	9.1	9.1	14	29	254	111	47	28	21
27	25	12	10	9.1	8.8	13	31	272	111	48	31	21
28	22	13	10	9.1	8.8	12	28	275	111	52	27	21
29	21	15	10	9.4	.....	12	30	278	113	68	24	21
30	21	16	10	9.4	.....	13	36	242	106	104	24	20
31	20	.....	9	9.4	.....	12	.....	176	.....	104	22	.....

NOTE.—Stage-discharge relation affected by ice Nov. 26–29 and Dec. 26 to Jan. 11; discharge based on one discharge measurement, temperature and gage-height records, and observer's notes.

Monthly discharge of Chalk Creek (upper station) near St. Elmo, Colo., for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	28	20	24.6	1,510
November	21	12	17.1	1,020
December	17	9	12.8	787
January	12	9.1	9.91	609
February	9.4	8.5	9.12	506
March	31	8.5	12.9	793
April	38	9	19.3	1,150
May	278	37	137	8,420
June	209	98	141	8,390
July	185	46	82.6	5,080
August	123	22	47.2	2,900
September	41	20	24.7	1,470
The year	278	8.5	45.1	32,600

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WEST BEAVER CREEK NEAR VICTOR, COLO.

LOCATION.—In sec. 30, T. 16 S., R. 68 W., at Skaguay power station of Arkansas Valley Railway, Light & Power Co., 7 miles southeast of Victor, Fremont County.

DRAINAGE AREA.—70 square miles.

RECORDS AVAILABLE.—January 1, 1905, to September 30, 1920.

DETERMINATION OF DISCHARGE.—Water used through power house is brought by pipe line from reservoir 3½ miles upstream; quantity measured hourly by weir, and a quantity representing the gain or loss in the reservoir during the period is added or subtracted. To determine the natural flow of the stream the seepage through the dam is measured by weir and added to the total quantity thus obtained. This method takes no account of evaporation from the surface of the reservoir.

DIVERSIONS.—Above the power reservoir are three reservoirs from which the town of Victor obtains its municipal supply. In the upper basin are four reservoirs from which water is diverted through St. John tunnel into Lake Moraine, and thence by natural channels to Colorado Springs, where it is used as municipal supply. During 1919, 1,840 acre-feet were diverted through St. John tunnel and during 1920, 2,180 acre-feet. Below the power plant adjudicated decrees for diversions of 126 second-feet from Beaver Creek, which is formed by East and West Beaver creeks. In addition, there is an irrigation reservoir in operation which has a filing for 4,760 acre-feet.

COOPERATION.—Records are furnished through courtesy of Arkansas Valley Railway, Light & Power Co.

Monthly discharge of West Beaver Creek near Victor, Colo., for the years ending Sept. 30, 1919 and 1920.

Month.	1918-19		1919-20	
	Mean discharge in second-feet.	Run-off in acre-feet.	Mean discharge in second-feet.	Run-off in acre-feet.
October	12.4	762	8.81	542
November	7.48	445	6.74	401
December	6.60	406	5.50	338
January	5.49	338	6.36	391
February	4.87	270	8.25	475
March	6.72	413	8.22	505
April	51.4	3,060	12.5	744
May	80.9	4,970	23.6	1,450
June	35.9	2,140	19.9	1,180
July	46.6	2,870	13.8	848
August	22.0	1,350	38.1	2,340
September	12.6	750	27.1	1,610
The year	24.6	17,800	14.9	10,900

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BOEHMER CREEK NEAR PIKES PEAK, COLO.

LOCATION.—In NW. ¼ sec. 32, T. 14 S., R. 68 W., 3½ miles south of Pikes Peak, El Paso County, above Little Beaver and Sackett creeks. Elevation of station, 11,000 feet.

DRAINAGE AREA.—7.2 square miles (measured on topographic map). About 75 per cent of this area is above timber line. To the natural drainage has been added that of West Beaver Creek above intake of Strickler tunnel.

RECORDS AVAILABLE.—October 1, 1909, to September 30, 1920.

DETERMINATION OF DISCHARGE.—Flow measured by sharp-crested weir, 60 inches long, with complete end contraction. A stake is driven into bed of stream in pool above weir, so that its head is level with crest of weir; depth of water over stake is measured by steel scale. Discharge is computed by Francis formula.

REGULATION.—Flow regulated by series of three reservoirs having an aggregate capacity of 1,400 acre-feet; reservoirs operated by Colorado Springs water department.

DIVERSIONS.—Water diverted above weir for use in Victor is measured and added to flow over Boehmer Creek weir to show total run-off.

COOPERATION.—Monthly discharge computed from records furnished by Colorado Springs water department.

Monthly discharge of Boehmer Creek near Pikes Peak, Colo., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 7.2 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1918–19.						
October	4.47	2.07	3.44	0.478	0.55	212
November	2.61	2.07	2.30	.319	.36	137
December	2.61	1.13	1.87	.260	.30	115
January	1.13	.73	.99	.138	.16	60.9
February	1.35	.64	.91	.126	.13	50.5
March	1.58	.92	1.09	.151	.17	67.0
April	8.21	1.13	2.63	.365	.41	156
May	33.0	7.80	20.5	2.85	3.29	1,260
June	23.6	17.3	19.3	2.68	2.99	1,150
July	19.5	11.9	15.8	2.19	2.52	972
August	13.3	6.9	10.0	1.39	1.60	615
September	5.51	3.01	3.82	.531	.59	227
The year	33.0	.64	6.93	.963	13.07	5,020
1919–20.						
October	3.20	2.61	2.83	.393	.45	174
November	5.15	1.95	3.44	.478	.53	205
December	1.95	.92	1.34	.186	.21	82.4
January	1.13	1.02	1.08	.150	.17	66.4
February	7.72	1.13	5.12	.711	.77	295
March	5.87	.82	2.73	.379	.44	168
April	1.35	.82	.98	.136	.15	58.3
May	11.7	1.35	5.32	.739	.85	327
June	7.40	4.47	5.53	.768	.86	329
July	6.00	4.10	5.00	.695	.80	307
August	23.6	5.50	12.5	1.74	2.01	769
September	18.0	5.15	9.07	1.26	1.41	540
The year	23.6	.82	4.57	.636	8.65	3,320

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LITTLE BEAVER CREEK NEAR PIKES PEAK, COLO.

LOCATION.—In NW. ¼ NW. ¼ sec. 32, T. 14 S., R. 68 W., just above mouth of creek and 3½ miles south of Pikes Peak, El Paso County. Little Beaver Creek enters Boehmer Creek from west 0.3 mile above reservoir No. 4. Elevation of station, 11,000 feet.

DRAINAGE AREA.—1.00 square mile (measured on topographic map). About 25 per cent of area above timber line; remainder sparsely timbered.

RECORDS AVAILABLE.—October 1, 1909, to September 30, 1920.

DETERMINATION OF DISCHARGE.—Flow measured by sharp-crested weir, 24 inches long, with complete end contraction. A stake is driven into bed of stream in pool above weir, so that its head is level with crest of weir; depth of water over stake is measured by steel scale. Discharge is computed by Francis formula.

DIVERSIONS.—None.

REGULATIONS.—None.

COOPERATION.—Monthly discharge computed from records furnished by Colorado Springs water department.

Monthly discharge of Little Beaver Creek near Pikes Peak, Colo., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 1.00 square mile.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1918–19.						
October	0.45	0.16	0.32	0.32	0.37	19.7
November	.29	.16	.21	.21	.23	12.5
December	.29	.16	.19	.19	.22	11.7
January	.16	.16	.16	.16	.18	9.84
February	.10	0	.05	.05	.05	2.78
March	0	0	0	0	0	0
April	1.04	.10	.28	.28	.31	16.7
May	5.05	.45	2.23	2.23	2.57	137
June	2.73	1.14	1.55	1.55	1.73	92.2
July	1.93	1.00	1.39	1.39	1.60	85.5
August	1.04	.54	.77	.77	.89	47.3
September	.54	.36	.46	.46	.51	27.4
The year	5.05	.00	.64	.64	8.66	463
1919–20.						
October	.36	.16	.24	.240	.28	14.8
November	.16	.10	.11	.110	.12	6.6
December	.12	.05	.08	.080	.09	4.9
January	.18	.16	.16	.160	.18	9.8
February	.16	.05	.11	.110	.12	6.3
March	.05	.03	.04	.040	.05	2.5
April	.16	.03	.09	.090	.10	5.4
May	1.53	.16	.69	.690	.80	42.4
June	1.28	.72	.94	.940	1.05	55.9
July	.82	.54	.68	.680	.78	41.8
August	2.34	.63	1.27	1.27	1.46	78.1
September	1.78	.82	1.20	1.20	1.34	71.4
The year	2.34	.03	.47	.47	6.37	340

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SACKETT CREEK NEAR PIKES PEAK, COLO.

LOCATION.—In SE. ¼ NW. ¼ sec. 32, T. 14 S., R. 68 W., just above mouth of creek and 4 miles southeast of Pikes Peak, El Paso County. Sackett Creek enters Boehmer Creek from north a short distance above reservoir No. 4. Elevation of station, 11,000 feet.

DRAINAGE AREA.—0.65 square mile (measured on topographic map). About 30 per cent of area above timber line; remainder sparsely timbered.

RECORDS AVAILABLE.—October 1, 1909, to September 30, 1920.

DETERMINATION OF DISCHARGE.—Flow measured by sharp-crested weir 24 inches long with complete end contraction. A stake is driven into bed of stream in pool above weir so that its head is level with crest of weir; depth of water over stake is measured by steel scale. Discharge is computed by Francis formula.

DIVERSIONS.—None.

REGULATION.—None.

COOPERATION.—Monthly discharge computed from records furnished by Colorado Springs water department.

Monthly discharge of Sackett Creek near Pikes Peak, Colo., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 0.65 square mile.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1918-19						
October	0.22	0.05	0.16	0.246	0.28	9.84
November	.05	0	.02	.031	.03	1.19
December	0	0	0	0	0	0
January	0	0	0	0	0	0
February	0	0	0	0	0	0
March	0	0	0	0	0	0
April	.45	0	.08	.123	.14	4.76
May	6.64	.16	2.19	3.37	3.88	135
June	1.34	.36	.73	1.12	1.25	43.4
July	.63	.10	.46	.708	.82	28.3
August	.36	.10	.21	.323	.37	12.9
September	.16	.10	.11	.169	.19	6.55
The year	6.64	0	.33	.512	6.96	242
1919-20.						
October	.05	.02	.03	.046	.05	1.8
November	0	0	0	0	0	0
December	0	0	0	0	0	0
January	0	0	0	0	0	0
February	0	0	0	0	0	0
March	0	0	0	0	0	0
April	0	0	0	0	0	0
May	1.04	.02	.42	.647	.75	25.8
June	.63	.22	.45	.692	.77	26.8
July	.45	.16	.31	.478	.55	19.1
August	2.96	.36	1.24	1.91	2.20	76.2
September	1.40	.45	.85	1.31	1.46	50.6
The year	2.96	0	.28	.430	5.78	200

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LION CREEK NEAR HALFWAY, COLO.

LOCATION.—In NW. ¼ sec. 15, T. 14 S., R. 68 W., at mouth of creek, half a mile southwest of Halfway, El Paso County. Lion Creek enters Ruxton Creek from west. Elevation of station, 9,250 feet.

DRAINAGE AREA.—2.00 square miles (measured on topographic map). Includes all area above the Crater apparently tributary to Sheep Creek. About 30 per cent of area above timber line; remainder sparsely timbered.

RECORDS AVAILABLE.—April 1, 1908, to September 30, 1920.

DETERMINATION OF DISCHARGE.—Flow measured by sharp-crested weir 30 inches long with complete end contraction. A stake is driven into bed of stream in pool above weir, so that its head is level with crest of weir; depth of water over stake is measured by steel scale. Discharge is computed by Francis formula.

DIVERSIONS.—None.

REGULATIONS.—None.

COOPERATION.—Monthly discharge computed from records furnished by Colorado Springs water department.

Monthly discharge of Lion Creek near Halfway, Colo., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 2.00 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1918–19.						
October	1.46	1.10	1.26	0.630	0.73	77.5
November	1.17	.79	.99	.500	.56	58.9
December	.86	.67	.73	.365	.42	44.9
January	.73	.56	.63	.315	.36	38.7
February	.56	.51	.53	.265	.28	29.4
March	.61	.46	.52	.260	.30	32.0
April	1.98	.51	1.08	.540	.60	64.3
May	2.75	1.03	1.76	.880	1.01	108
June	2.78	.91	1.19	.595	.66	70.8
July	1.63	.91	1.24	.620	.72	76.2
August	1.63	1.30	1.43	.715	.82	87.9
September	1.52	.97	1.18	.590	.66	70.2
The year	2.78	.46	1.05	.523	7.12	759
1919–20.						
October	1.10	.91	1.00	.500	.58	61.5
November	.91	.79	.86	.430	.48	51.2
December	.79	.67	.70	.350	.40	43.0
January	.67	.56	.60	.300	.35	36.9
February	.67	.61	.62	.310	.33	35.7
March	.67	.56	.61	.305	.35	37.5
April	.91	.27	.64	.320	.36	38.1
May	.97	.73	.82	.410	.47	50.4
June	.97	.46	.60	.300	.33	35.7
July	.97	.41	.53	.265	.31	32.6
August	.91	.67	.76	.380	.44	46.7
September	2.75	.79	1.41	.705	.79	83.9
The year	2.75	.27	.76	.380	5.19	553

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SHEEP CREEK NEAR HALFWAY, COLO.

LOCATION.—In SW. ¼ sec. 11, T. 14 S., R. 68 W., a quarter of a mile west of Halfway, El Paso County. No tributary between station and mouth, a short distance below. Sheep Creek enters Ruxton Creek from west a short distance above Halfway. Elevation of station, 9,100 feet.

DRAINAGE AREA.—0.73 square mile (measured on topographic map). Does not include any area above the Crater as this is most probably tributary to Lion Creek. Practically all below timber line, but sparsely timbered.

RECORDS AVAILABLE.—April 1, 1908, to September 30, 1920.

DETERMINATION OF DISCHARGE.—Flow measured by sharp-crested weir 30 inches long with complete end contraction. A stake is driven into bed of stream in pool above weir, so that its head is level with crest of weir; depth of water over stake is measured by steel scale. Discharge is computed by Francis formula.

DIVERSIONS.—None.

REGULATION.—None.

COOPERATION.—Monthly discharge computed from records furnished by Colorado Springs water department.

Monthly discharge of Sheep Creek near Halfway, Colo., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 0.73 square mile.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1918–19.						
October	0.46	0.36	0.42	0.575	0.66	25.8
November	.41	.32	.37	.507	.57	22.0
December	.36	.27	.32	.438	.50	19.7
January	.27	.27	.27	.370	.43	16.6
February	.27	.20	.22	.301	.31	12.2
March	.20	.16	.19	.260	.30	11.7
April	2.07	.23	.74	1.01	1.13	44.0
May	2.75	.91	1.77	2.42	2.79	109
June	.91	.46	.62	.849	.95	36.9
July	.97	.46	.74	1.01	1.16	45.5
August	.91	.46	.63	.863	1.00	38.7
September	.73	.36	.48	.658	.73	28.6
The year	2.75	.16	.57	.773	10.53	411
1919–20.						
October	.41	.32	.35	.480	.55	21.5
November	.46	.23	.28	.384	.43	16.7
December	.27	.23	.23	.316	.36	14.1
January	.27	.23	.23	.316	.36	14.1
February	.23	.23	.23	.316	.34	13.2
March	.27	.20	.23	.316	.36	14.1
April	.32	.13	.25	.343	.38	14.9
May	.79	.41	.55	.753	.87	33.8
June	.61	.23	.38	.522	.58	22.6
July	.41	.20	.28	.384	.44	17.2
August	2.07	.36	1.17	1.60	1.84	71.9
September	1.17	.56	.86	1.18	1.32	51.2
The year	2.07	.13	.42	.575	7.83	305

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SOUTH RUXTON CREEK AT HALFWAY, COLO.

LOCATION.—In SW. sec. 11. T. 14 S., R. 68 W., just above hydroelectric intake at Halfway, El Paso County. No tributary between station and mouth, a short distance below. South Ruxton Creek enters Ruxton Creek from south at Halfway. Elevation of station, 9,000 feet.

DRAINAGE AREA.—3.95 square miles (measured on topographic map). Practically all below timber line and heavily timbered.

RECORDS AVAILABLE.—June 1, 1906, to September 30, 1920.

DETERMINATION OF DISCHARGE.—Flow measured by two sharp-crested weirs, with complete end contraction. Discharge is computed by Francis formula. The main weir is one-third mile above mouth of creek and a short distance above hydroelectric intake which has a capacity of 4.63 second-feet. The second weir is half way between main weir and mouth of the creek and measures the inflow chiefly from springs below intake and a small amount of seepage. At all times except during high water, the capacity of intake is sufficient to take entire flow passing main weir, and flow at the two weirs is combined to give the total run-off from the basin. During high water the excess passing intake and recorded at lower weir does not represent increased flow between weirs, and is discarded. In its place is used a constant quantity based on inflow and seepage at other times.

DIVERSIONS.—None.

REGULATION.—None.

COOPERATION.—Monthly discharge computed from records furnished by Colorado Springs water department.

Monthly discharge of South Ruxton Creek at Halfway, Colo., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 3.95 square miles].

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1918–19.						
October	2.10	1.60	1.87	0.473	0.55	115
November	1.75	1.30	1.51	.382	.43	89.8
December	1.38	1.17	1.23	.312	.36	75.6
January	1.17	.97	1.08	.273	.31	66.4
February	.97	.85	.92	.233	.24	51.1
March	1.03	.79	.90	.228	.26	55.3
April	5.28	.91	2.38	.603	.67	142
May	8.83	4.10	7.45	1.89	2.18	458
June	8.57	4.41	5.30	1.34	1.50	315
July	5.40	4.00	4.50	1.14	1.31	277
August	4.00	2.40	3.14	.795	.92	193
September	2.57	2.07	2.30	.582	.65	137
The year	8.83	.79	2.73	.691	9.38	1,980
1919–20.						
October	2.10	1.52	1.84	.466	.54	113
November	1.52	1.24	1.37	.347	.39	81.5
December	1.24	1.10	1.15	.291	.34	70.7
January	1.10	.97	1.03	.261	.30	63.3
February	.97	.91	.94	.238	.26	54.1
March	1.10	.91	.96	.243	.28	59.0
April	1.30	.85	1.03	.261	.29	61.3
May	3.41	1.17	1.97	.499	.58	121
June	2.84	1.90	2.24	.567	.63	133
July	2.75	1.52	1.85	.468	.54	114
August	8.40	1.98	5.90	1.49	1.72	363
September	5.17	2.23	3.58	.903	1.01	213
The year	8.40	.85	1.99	.504	6.87	1,450

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CABIN CREEK NEAR HALFWAY, COLO.

LOCATION.—In SW. ¼ NW. ¼ sec. 11, T. 14 S., R. 68 W., just above hydroelectric intake, about three-eighths mile north of Halfway, El Paso County. Cabin Creek enters Ruxton Creek half a mile below Halfway. Elevation of station, about 9,000 feet.

DRAINAGE AREA.—2.4 square miles (measured on topographic map). About 15 per cent of area above timber line; remainder sparsely timbered.

RECORDS AVAILABLE.—October 1, 1906, to September 30, 1920.

DETERMINATION OF DISCHARGE.—Flow measured by two sharp-crested weirs with complete end contraction. Discharge computed by Francis formula. The main weir is about one-third of a mile above mouth of creek and just above the hydroelectric intake. The second weir is 50 feet above mouth of creek and measures flow from springs and small tributaries entering below intake. Except during high water the measured flow at weirs is combined to give total run-off from basin. During high water, record from the lower weir is discarded and inflow estimated. (See South Ruxton Creek at Halfway, Colo.)

DIVERSIONS.—None.

REGULATIONS.—None.

COOPERATION.—Monthly discharge computed from records furnished by Colorado Springs water department.

Monthly discharge of Cabin Creek near Halfway, Colo., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 2.4 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1918-19.						
October	1.83	1.24	1.50	0.625	0.72	92.2
November	1.24	.85	1.05	.437	.49	62.5
December	.85	.73	.75	.312	.36	46.1
January	.67	.46	.57	.238	.27	35.0
February	.46	.41	.43	.179	.19	23.9
March	.51	.36	.44	.183	.21	27.1
April	3.70	.56	1.71	.712	.79	102
May	5.74	3.31	4.38	1.82	2.10	269
June	3.50	1.75	2.29	.954	1.06	136
July	3.31	1.63	2.66	1.11	1.28	164
August	2.49	1.45	1.80	.750	.86	111
September	1.65	1.03	1.25	.521	.58	74.4
The year	5.74	.36	1.58	.656	8.91	1,140
1919-20.						
October	1.10	.91	.99	.413	.48	60.9
November	.91	.73	.81	.338	.38	48.2
December	.73	.56	.63	.263	.30	38.7
January	.56	.46	.49	.204	.24	30.1
February	.46	.36	.44	.183	.20	25.3
March	.51	.36	.41	.171	.20	25.2
April	.79	.27	.53	.221	.25	31.5
May	2.67	1.03	1.63	.680	.78	100
June	2.10	1.10	1.55	.647	.72	92.2
July	1.24	.85	1.04	.433	.50	64.0
August	5.28	1.10	3.19	1.33	1.53	196
September	4.52	1.90	2.85	1.19	1.33	170
The year	5.28	.27	1.22	.508	6.91	882

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SUTHERLAND CREEK NEAR MANITOU, COLO.

LOCATION.—In SW. ¼ sec. 9, T. 14 S., R. 67 W., 1½ miles southeast of Manitou, El Paso County. No large tributary between station and mouth, 1 mile below. Elevation of station, 6,600 feet.

DRAINAGE AREA.—4.4 square miles (measured on topographic map). Practically all below timber line.

RECORDS AVAILABLE.—January 1, 1918, to September 30, 1920.

DETERMINATION OF DISCHARGE.—Flow measured by sharp-crested weir, 30 inches long, with complete end contraction. A stake is driven into bed of stream in pool above weir, so that its head is level with crest of weir, depth of water over stake is measured by steel scale. Discharge is computed by Francis formula.

DIVERSIONS.—None.

REGULATION.—None.

COOPERATION.—Monthly discharge computed from records furnished by Colorado Springs water department.

Monthly discharge of Sutherland Creek near Manitou, Colo., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 4.4 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1918–19.						
October	1.17	0.79	0.86	0.195	0.22	52.9
November	.97	.79	.84	.191	.21	50.0
December	.85	.79	.79	.180	.21	48.6
January	1.17	.56	.69	.157	.18	42.4
February	.79	.46	.66	.150	.16	36.7
March	1.03	.67	.78	.177	.20	48.0
April	4.52	1.03	1.91	.434	.48	114
May	6.32	3.70	4.86	1.10	1.27	299
June	3.70	1.60	2.49	.566	.63	148
July	2.23	1.30	1.59	.361	.42	97.8
August	1.90	.79	1.09	.248	.29	67.0
September	1.75	.79	1.05	.239	.27	62.5
The year	6.32	.46	1.47	.334	4.54	1,070
1919–20.						
October	1.03	.79	.86	.195	.22	52.9
November	.91	.67	.79	.180	.20	47.0
December	.79	.67	.74	.168	.19	45.5
January	.79	.67	.74	.168	.19	45.5
February	.79	.67	.69	.157	.17	39.7
March	1.03	.67	.70	.159	.18	43.0
April	1.03	.79	.87	.198	.22	51.8
May	1.90	1.03	1.44	.327	.38	88.5
June	1.60	.91	1.20	.273	.30	71.4
July	.91	.56	.77	.175	.20	47.3
August	2.93	.79	1.78	.405	.47	109
September	1.90	.79	1.27	.289	.32	75.6
The year	2.93	.56	.99	.224	3.04	717

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BEAR CREEK NEAR COLORADO SPRINGS, COLO.

LOCATION.—In NE. ¼ sec. 21, T. 14 S., R. 67 W., 3½ miles west of Colorado Springs, El Paso County. Nearest tributary, Hunters Run, enters a short distance above. Elevation of station, 6,615 feet.

DRAINAGE AREA.—6.9 square miles (measured on topographic map). Practically all below timber line.

RECORDS AVAILABLE.—March 1, 1918, to September 30, 1920.

DETERMINATION OF DISCHARGE.—Flow measured by sharp-crested weir, 30 inches long, with complete end contraction. A stake is driven into bed of stream in pool above weir, so that its head is level with crest of weir; depth of water over stake is measured by steel scale. Discharge is computed by Francis formula.

DIVERSIONS.—None.

REGULATION.—None.

COOPERATION.—Monthly discharge computed from records furnished by Colorado Springs water department.

Monthly discharge of Bear Creek near Colorado Springs, Colo., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 6.9 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1918-19.						
October	2.57	1.90	2.14	0.310	0.36	132
November	2.07	1.17	1.86	.270	.30	111
December	2.07	1.30	1.62	.235	.27	99.6
January	1.45	1.30	1.39	.202	.23	85.5
February	1.90	1.24	1.34	.194	.20	74.4
March	3.31	1.30	1.78	.258	.30	109
April	10.2	3.06	4.62	.670	.75	275
May	11.8	5.40	8.27	1.20	1.38	508
June	5.28	2.93	3.89	.564	.63	231
July	3.50	1.90	2.50	.362	.42	154
August	2.67	1.24	1.78	.258	.30	109
September	6.68	1.30	2.21	.320	.36	132
The year	11.8	1.17	2.80	.404	5.50	2,020
1919-20.						
October	2.07	1.75	1.86	.270	.31	114
November	2.07	1.17	1.75	.254	.28	104
December	1.63	1.30	1.55	.225	.26	95.3
January	1.63	1.03	1.41	.204	.24	86.7
February	2.10	1.60	1.76	.255	.28	101
March	2.57	1.45	1.90	.275	.32	117
April	2.49	1.30	1.91	.277	.31	114
May	3.06	2.07	2.36	.342	.39	145
June	2.60	1.45	1.94	.281	.31	115
July	1.63	1.03	1.35	.196	.23	83.0
August	8.05	1.30	3.31	.480	.55	204
September	3.22	1.98	2.50	.362	.40	149
The year	8.05	1.03	1.97	.286	3.88	1,430

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NEOSHO RIVER NEAR IOLA, KANS.

LOCATION.—In NE. ¼ sec. 9, T. 25 S., R. 18 E., 2½ miles south and 1½ miles west of Iola, Allen County. Elm Creek enters from east 1 mile upstream, and Owl Creek enters from west 8 miles downstream.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 12, 1917, to September 30, 1920. August 1, 1895, to November 30, 1903, a gaging station was maintained about 4 miles upstream, 1 mile west of Iola, at city water and power house dam. The United States Weather Bureau staff gage is a short distance upstream from this dam.

GAGE.—Stevens continuous water-stage recorder on left bank. Staff gage at this location is in two sections; lower inclined, upper vertical and fastened to downstream side of concrete gage well. During periods when recorder was not operating satisfactorily staff gage was read by Ruth Conger until March 14, 1920, and by Esther Teats thereafter.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading above pipe-line ford about three-fourths of a mile downstream from gage.

CHANNEL AND CONTROL.—Control is long shale riffle, half a mile downstream from gage, terminating at pipe-line ford, where a 16-inch gas pipe line, anchored by concrete blocks in channel, crosses the stream bed; probably permanent. At low water, pooled section at gage. Bed composed of gravel. Left bank is high and well-defined ledge of limestone confines the flood channel on the left bank near the gage. Right bank is lower but is overflowed only for about three fourths of a mile at extreme high stages. On account of the high banks this section of the river is less subject to overflow than elsewhere along the Neosho Valley, in this vicinity. Channel is straight for a long distance upstream and bends slightly downstream from gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 19.4 feet at 4 a. m. March 21 (discharge, 23,700 second-feet); minimum stage, 2.55 feet, October 3 to 5 (discharge, 8 second-feet).

Maximum stage recorded during year ending September 30, 1920, 13.1 feet at 11 a. m. September 9 (discharge, 11,300 second-feet); minimum stage 1.9 feet June 23 (discharge, 1 second-foot).

1917–1920: Maximum stage recorded, same as given above for March 21, 1919; minimum stage that of June 23, 1920.

1895–1903: United States Geological Survey record: Maximum stage recorded, 22.0 feet, June 3, 1904 (discharge, 39,100 second-feet); higher discharge given for 20.1 feet, May 24, 1896 (discharge, 45,600 second-feet). 1904: Maximum stage, 24.0 feet, July 10, 1904, determined from high-water marks (discharge, estimated as 74,600 second-feet). Minimum discharge, zero, several days in September and October, 1897.

ICE.—Stage-discharge relation affected by ice; flow estimated from observer's notes, and records of precipitation and temperature. No winter discharge measurements made.

DIVERSIONS.—Water is taken from river by cities upstream for domestic water supply.

REGULATION.—Low-water flow is regulated by dams upstream.

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ACCURACY.—Stage-discharge relation fairly permanent. Rating curve, used October 1, 1918, to May 20, 1919, well defined below 10,000 second-feet; extended to cover high stages by area-velocity curve study; curve used May 21, 1919 to September 30, 1920, well defined between 40 and 10,000 second-feet. Water-stage recorder checked weekly by observer's reading of outside staff gage to quarter-tenths. No record from water-stage recorder: October 6–12, 23–25, 30, November 8–14, 1918, October 25, 26, October 31 to November 12, December 9–12, 1919, March 7–14, June 7–9, July 16, July 29 to August 4, 1920; approximate gage heights for purposes of estimating discharge were determined from gage relation between United States Weather Bureau gage above dam at Iola (see "Location," "Records available") and United States Geological Survey water-stage recorder, using United States Weather Bureau gage record. March 26 to August 1, 1919, intake pipe was partially clogged and recorder was not always recording same as outside staff gage. During this period observer made daily readings on staff gage which enabled the graph to be corrected to outside gage datum. Well and intake were cleaned, August 2, 1919. March 30, 1920, recorder started to read higher than outside gage; intake and well partially clogged. This condition occurred irregularly with the stage of the river. August 29, 1920, the well was cleaned out thoroughly, but a rapid rise in river prevented cleaning intake pipe until October 1, 1920. During these periods observer made some extra readings and graph was corrected to outside gage datum. Daily discharge ascertained by applying mean daily gage height to rating table, except for periods, December 29, 1918, to January 18, 1919, and December 12–28, 1919, when stage-discharge relation was affected by ice; flow estimated for these periods from observer's notes and records of precipitation and temperature. Records good for low and medium stages, fair for high stages on account of intake clogging and uncertainty in gage record during these periods, for year ending September 30, 1919; good for year ending September 30, 1920.

Discharge measurements of Neosho River near Iola, Kans., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 26	R. C. Rice	5.57	1,380	Aug. 3	E. L. Grant	3.04	96
May 22	do	10.28	6,780	1920.			
23	do	9.46	5,850	Mar. 19	A. K. Gowans	2.82	50
				Aug. 26	do	6.42	2,260

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Daily gage height, in feet, of Neosho River near Iola, Kans., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	2.6	4.7	3.55	4.35	4.45	4.25	5.0	11.95	4.85	6.6	3.1	2.75
2	2.6	4.25	3.55	4.4	4.4	4.15	4.95	14.6	4.65	5.8	3.05	2.75
3	2.55	3.95	3.55	4.55	4.3	4.15	4.9	16.0	4.65	5.1	3.05	2.8
4	2.55	3.8	3.5	4.2	4.3	4.55	4.75	11.65	5.05	4.7	3.1	2.8
5	2.55	3.7	3.45	4.15	4.6	5.2	4.7	6.85	6.05	4.45	3.1	2.8
6	.....	3.6	3.4	4.1	5.0	4.85	4.55	6.35	6.0	4.8	3.6	2.8
7	.....	4.85	3.5	4.0	4.8	4.65	4.65	6.0	5.55	4.45	3.6	2.8
8	.....	.....	3.6	4.0	4.5	4.45	5.7	5.7	5.0	4.1	3.2	2.8
9	.....	.....	3.6	4.0	4.35	4.35	8.4	5.45	4.7	3.95	3.1	2.8
10	.....	.....	3.55	4.0	4.2	4.25	11.35	5.2	6.8	3.9	3.0	2.8
11	.....	.....	3.55	4.0	4.15	4.2	12.15	4.95	6.9	3.8	3.0	2.8
12	.....	.....	3.5	4.2	4.1	4.15	11.25	4.95	6.5	3.65	2.9	2.8
13	4.35	.....	3.5	4.85	4.15	4.1	8.4	5.55	5.5	3.55	3.0	2.95
14	4.0	.....	3.7	5.15	4.25	4.1	6.7	5.6	6.5	3.45	3.0	2.9
15	3.75	4.45	4.35	5.9	4.25	4.1	5.7	5.1	6.4	3.75	3.0	2.9
16	3.55	4.25	5.4	6.9	4.25	5.7	5.4	5.95	6.3	3.7	2.95	2.9
17	3.45	4.2	5.55	7.35	4.15	12.45	5.15	5.6	5.65	3.35	2.95	2.8
18	3.4	4.05	4.9	7.75	4.05	15.6	5.0	5.6	5.3	3.25	2.9	2.8
19	3.25	4.0	4.5	9.1	4.0	17.65	4.85	13.0	5.65	3.3	2.9	2.75
20	3.15	3.9	4.8	9.95	4.05	19.0	4.75	14.9	5.9	3.2	2.85	2.75
21	3.0	3.8	5.25	10.4	4.1	18.65	4.65	10.65	5.6	3.2	2.85	2.7
22	3.0	3.7	4.95	9.25	4.55	9.7	4.55	10.4	6.05	3.2	2.8	2.7
23	.....	3.6	5.05	7.6	5.3	6.4	4.55	9.1	8.5	3.25	2.8	2.7
24	.....	3.55	4.95	6.5	5.65	5.9	4.45	6.25	9.05	3.2	2.8	2.7
25	.....	3.5	4.65	5.9	5.35	5.65	4.4	5.25	7.55	3.1	2.85	2.65
26	3.15	3.45	4.4	5.55	4.85	5.55	4.4	5.15	5.3	3.1	2.85	2.7
27	3.3	3.45	4.15	5.3	4.5	5.45	4.4	5.0	5.15	3.2	2.85	2.75
28	4.9	3.55	4.05	5.1	4.4	5.35	4.85	4.95	4.8	3.1	3.05	2.75
29	7.75	3.6	4.2	4.9	.....	5.2	4.95	5.05	4.25	3.0	3.0	2.75
30	.....	3.55	4.35	4.7	.....	5.1	7.05	5.05	6.7	3.1	2.85	2.75
31	5.45	.....	4.5	4.55	.....	5.1	.....	4.95	.....	3.05	2.8	.....
1919–20.												
1	2.75	.....	3.05	3.0	2.85	2.8	3.75	3.25	3.8	2.15	.....	8.1
2	2.7	.....	3.0	3.05	2.85	2.8	3.85	3.2	6.25	8.7	.....	8.2
3	2.75	.....	2.9	3.05	2.85	2.8	3.55	3.25	5.15	8.4	.....	6.55
4	2.75	.....	2.85	2.95	2.85	2.85	3.55	3.5	4.85	5.2	3.5	8.25
5	2.75	.....	2.8	2.95	2.85	2.9	3.6	3.55	5.75	3.9	3.3	7.75
6	2.75	.....	2.8	2.95	2.85	2.9	3.85	3.5	4.55	3.45	3.1	6.4
7	2.75	2.9	2.8	3.0	2.85	.....	3.8	3.45	.....	3.1	3.0	6.0
8	2.75	.....	2.85	2.95	2.9	.....	3.6	3.4	.....	2.85	2.95	10.45
9	2.8	2.85	2.95	2.95	2.9	.....	3.5	3.3	.....	2.75	3.95	12.75
10	2.95	.....	.....	2.95	2.95	.....	3.45	3.25	3.35	2.7	4.15	9.25
11	2.95	.....	.....	3.0	2.9	.....	3.45	3.2	2.8	2.6	3.5	5.75
12	2.85	2.9	2.9	2.95	2.9	.....	3.7	3.25	2.4	2.55	3.55	4.75
13	2.8	2.85	2.95	2.9	2.9	.....	4.75	3.2	2.35	2.65	3.45	4.35
14	2.8	2.8	2.95	2.85	2.9	2.75	4.85	3.2	2.3	3.15	3.25	4.65
15	2.8	2.75	2.95	2.85	2.9	2.9	4.85	3.25	2.3	3.0	3.15	4.35
16	2.85	2.8	2.9	2.85	2.9	3.0	4.85	3.2	2.3	.....	2.95	4.4
17	2.8	2.85	2.8	2.9	2.9	3.0	3.9	3.2	2.25	4.85	2.85	4.45
18	2.85	2.9	2.8	3.0	2.9	2.9	4.4	.....	2.15	5.6	2.75	3.85
19	2.95	3.1	2.9	3.05	2.85	2.85	4.65	.....	2.1	5.6	2.7	3.6
20	2.95	3.05	2.95	3.0	2.9	2.8	4.15	.....	2.1	4.45	2.8	3.5
21	2.9	3.05	2.9	2.95	2.9	2.8	4.05	3.35	2.05	3.95	3.25	3.45
22	2.85	3.0	2.9	2.95	2.9	2.8	3.6	3.25	1.95	3.65	3.45	3.4
23	2.8	2.95	2.85	2.95	2.85	2.8	3.45	3.25	1.9	3.4	3.15	3.3
24	2.85	2.95	2.8	2.9	2.85	3.2	3.35	3.8	1.95	3.25	2.95	3.2
25	.....	2.95	3.35	2.85	2.8	6.55	3.3	3.95	1.95	3.2	3.05	3.15
26	.....	2.85	3.35	2.85	2.75	8.8	3.3	4.1	1.95	3.25	5.8	3.1
27	2.95	2.8	3.25	2.85	2.7	5.5	3.35	4.55	1.95	3.2	4.4	3.1
28	2.9	2.9	3.15	2.85	2.75	4.55	3.35	6.1	1.95	3.05	3.5	3.05
29	2.85	3.15	3.05	2.9	2.75	5.0	3.25	4.7	1.95	.....	3.8	3.05
30	2.8	3.15	3.05	2.95	.....	4.25	3.25	4.4	2.0	.....	8.05	3.0
31	.....	.....	3.05	2.9	.....	3.8	.....	4.05	.....	.....	7.15	.....

NOTE.—Stage-discharge relation affected by ice Dec. 29, 1918, to Jan. 18, 1919, and Dec. 12–28, 1919.

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Daily discharge, in second-feet, of Neosho River near Iola, Kans., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	10	844	258		699	592	1,020	9,400	930	2,260	109	42
2	10	592	258		670	540	989	13,900	810	1,600	96	42
3	8	436	258		618	540	960	16,600	810	1,080	96	48
4	8	365	238		618	757	873	8,920	1,050	840	109	48
5	8	320	216		786	1,150	844	2,520	1,820	698	109	48
6	8	276	196	400	1,020	931	757	2,020	1,780	900	280	48
7	8	931	238		902	815	815	1,720	1,400	698	280	48
8	8	[b]1,560	276		728	699	1,490	1,490	1,020	510	139	48
9	8	[b]10,900	276		644	644	4,330	1,320	840	435	109	48
10	[b] 8	[b]12,500	258		566	592	8,460	1,150	2,470	410	84	48
11	[b]2,160	[b]11,400	258		540	566	9,720	989	2,580	365	84	48
12	[b]2,070	[b]2,260	238	[a] 450	514	540	8,300	989	2,160	300	64	48
13	644	[b]1,020	238	[a] 600	540	514	4,330	1,380	1,360	260	84	74
14	462	[b] 844	320	[a] 800	592	514	2,360	1,420	2,160	222	84	64
15	342	699	644	[a]1,500	592	514	1,490	1,080	2,160	342	84	64
16	258	592	1,280	[a]2,500	592	1,490	1,280	1,680	2,060	320	74	64
17	216	566	1,380	[a]2,800	540	10,200	1,110	1,420	1,480	188	74	48
18	196	488	960	[a]3,600	488	15,800	1,020	1,420	1,220	154	64	48
19	143	462	728	5,240	462	20,000	931	11,100	1,480	170	64	42
20	110	410	902	6,430	488	22,800	873	14,500	1,600	139	56	42
21	68	365	1,180	7,060	514	22,100	815	7,410	1,440	139	56	36
22	68	320	989	5,450	757	6,080	757	7,060	1,820	139	48	36
23	78	276	1,050	3,370	1,210	2,070	757	5,240	4,460	154	48	36
24	89	258	989	2,160	1,460	1,640	699	2,010	5,180	139	48	36
25	100	238	815	1,640	1,240	1,460	670	1,180	3,310	109	56	31
26	110	216	670	1,380	931	1,380	670	1,120	1,220	109	56	36
27	160	216	540	1,210	728	1,320	670	1,020	1,120	139	56	42
28	960	258	488	1,080	670	1,240	931	990	990	109	96	42
29	3,550	276		960	.....	1,150	989	1,050	588	84	84	42
30	[b]2,580	258	400	844	.....	1,080	2,740	1,050	2,360	109	56	42
31	1,320	.....		757	.....	1,080	.....	990	.....	96	48	.....
1919–20.												
1	24	[b] 30	82	68	38	30	342	143	365	5	[b] 84	3,970
2	18	[b] 30	68	82	38	30	388	126	1,960	4,720	[b] 109	4,090
3	24	[b] 30	46	82	38	30	258	143	1,120	4,330	[b] 170	2,240
4	24	[b] 38	38	57	38	38	258	238	930	1,150	240	4,150
5	24	[b] 38	30	57	38	46	276	258	1,560	410	170	3,560
6	24	[b] 38	30	57	38	46	388	238	752	222	109	2,100
7	24	46	30	68	38	44	365	216	[b] 410	109	84	1,760
8	24	[b] 46	38	57	46	41	276	196	[b] 280	56	74	7,130
9	30	38	57	57	46	38	238	160	[b] 205	42	435	10,700
10	57	[b] 38	[b] 46	57	57	35	216	143	[b] 188	36	535	5,450
11	57	[b] 38	[b] 46	68	46	32	216	126	48	26	240	1,560
12	38	46		57	46	29	320	143	12	22	260	870
13	30	38		46	46	26	873	126	10	31	222	642
14	30	30		38	46	24	931	126	8	124	154	810
15	30	24		38	46	46	931	143	8	84	124	642
16	38	30		38	46	68	931	126	8	[b] 320	74	670
17	30	38		46	46	68	410	126	7	930	56	698
18	38	46		68	46	46	670	[b] 126	5	1,440	42	388
19	57	96		82	38	38	815	[b] 126	4	1,440	36	280
20	57	82	40	68	46	30	[a] 540	[b] 238	4	698	48	240
21	46	82		57	46	30	488	188	3	435	154	222
22	38	68		57	46	30	276	154	1.5	300	222	205
23	30	57		57	38	30	216	154	1.0	205	124	170
24	38	57		46	38	126	180	365	1.5	154	74	139
25	[b] 38	57		38	30	2,210	160	435	1.5	139	96	124
26	[b] 38	38		38	24	4,850	160	510	1.5	154	1,600	109
27	57	30		38	18	1,350	180	752	1.5	139	670	109
28	46	46		38	24	757	180	1,840	1.5	96	240	96
29	38	110	82	46	24	1,020	143	840	1.5	[b] 84	365	96
30	30	110	82	57	.....	592	143	670	2.0	[b] 84	3,910	84
31	[b] 30	.....	82	46	.....	365	.....	485	.....	[b] 64	2,860	.....

[a] Estimated because of ice.
[b] Estimated by comparison with gage-height record of United States Weather Bureau gage at Iola.
NOTE.—Braced figures show mean discharge for periods indicated.

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Monthly discharge of Neosho River near Iola, Kans., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	3,550	8	509	31,300
November	12,500	216	1,670	99,400
December	1,380	196	559	34,400
January	7,060	.....	1,750	108,000
February	1,460	462	718	39,900
March	22,800	514	3,900	240,000
April	9,720	670	2,060	123,000
May	16,600	989	4,000	246,000
June	5,180	588	1,790	107,000
July	2,260	84	426	26,200
August	280	48	90.2	5,550
September	74	31	46.3	2,760
The year	22,800	8	1,470	1,060,000
1919–20.				
October	57	18	35.7	2,200
November	110	24	49.8	2,960
December	82	.....	46.4	2,850
January	82	38	55.1	3,390
February	57	18	39.8	2,290
March	4,850	24	392	24,100
April	931	143	392	23,300
May	1,840	126	312	19,200
June	1,960	1.0	263	15,600
July	4,720	5	582	35,800
August	3,910	36	438	26,900
September	10,700	84	1,780	106,000
The year	10,700	1.0	364	265,000

RED RIVER BASIN.

MEDICINE BLUFF CREEK NEAR LAWTON, OKLA.

LOCATION.—In sec. 18, T. 3 N., R. 12 W., at Medicine Park, 12 miles northwest of Lawton, Comanche County. Nearest tributary, Little Medicine Bluff Creek, enters half a mile above.

DRAINAGE AREA.—About 110 square miles.

RECORDS AVAILABLE.—November 26, 1912, to September 30, 1919, when station was discontinued.

GAGE.—Stevens water-stage recorder installed February 16, 1915, on left bank one-third mile below Medicine Park Hotel. Original gage was vertical staff on left bank a short distance below hotel, and set to datum 0.68 foot higher than that of the present gage; fall between the two points, 0.18 foot. On February 19, 1917, dam was completed 200 feet downstream, which turned section of the creek into a pool and changed control completely. Datum of water-stage recorder raised. No definite relations between gage heights before and after completion of dam.

DISCHARGE MEASUREMENTS.—Made from cable 100 yards above gage or by wading.

CHANNEL AND CONTROL.—Control is crest of concrete dam.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 3.54 feet November 7 (discharge, 1,250 second-feet); minimum stage recorded, 1.63 feet January 14 (discharge, 1.7 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Lawton waterworks diverts about 1.6 second-feet from Lawton reservoir on Medicine Bluff Creek.

REGULATION.—Flow controlled to a great extent by Lawton reservoir, which is situated 1½ miles upstream; capacity, 14,000 acre-feet.

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ACCURACY.—Stage-discharge relation practically permanent: not affected by ice. Rating curve fairly well defined. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records fair, except for periods of missing gage heights, for which they are roughly approximate.

Daily discharge, in second-feet, of Medicine Bluff Creek near Lawton, Okla., for the year ending Sept. 30, 1919.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	8	2.6	229	2.6	51	145	18	20	34	34	12
2	10	2.6	228	2.6	28	290	18	50	51	34	12
3	15	2.6	160	3.8	5	440	18	100	51	34	12
4	18	3.6	88	5.0	12	400	26	200	34	18	12
5	21	4.1	18	5.0	18	375	34	200	18	18	12
6	48	7.6	16	5.0	15	345	42	228	18	18	12
7	1,250	3.6	18	3.8	12	315	51	260	18	12	12
8	461	3.1	10	2.6	12	360	51	315	34	12	12
9	233	3.1	5.0	2.6	12	408	51	910	12	12	12
10	130	2.6	3.8	2.6	12	390	51	1,100	5	12	12
11	86	2.6	2.6	2.6	23	375	51	440	5	18	12
12	51	3.1	2.6	2.6	34	290	51	315	12	18	12
13	60	3.1	2.6	3.8	50	260	42	228	5	12	12
14	51	3.1	1.7	5.0	100	214	34	255	5	12	12
15	44	3.1	5.0	4.2	200	228	20	228	12	12	12
16	95	6.3	3.8	3.4	51	214	5	200	12	12	12
17	135	4.5	2.6	2.6	33	200	50	95	18	12	12
18	120	3.1	100	3.8	12	170	95	95	34	12	18
19	140	21	375	5.0	9	145	120	73	200	12	18
20	200	211	100	5.0	5	130	145	73	255	12	34
21	200	261	40	5.0	5	120	98	34	200	18	18
22	145	228	20	102	5	110	51	18	145	18	18
23	34	333	5.0	200	102	95	35	34	95	12	12
24	17	297	5.0	214	200	73	18	34	51	12	12
25	5	255	5.0	228	106	51	18	18	51	12	12
26	5	228	5.0	214	12	62	18	20	34	5	12
27	5	226	5.0	260	9	78	18	23	34	5	12
28	9	211	3.8	126	5	73	18	26	34	5	12
29	4	211	2.6	.....	50	73	18	29	34	5	12
30	3	211	2.6	.....	95	45	18	32	34	5	12
31	.....	211	2.6	.....	120	.....	18	.....	34	12	.....

NOTE.—No gage-height record Nov. 1–4, Jan. 1, 3–4, 6–8, 10, 12, 16, 18, 20–26, 28, 30, Feb. 1, 3, 5, 7, 9, 11, 13, 15–16, 18, 20, 22, 24, 26, 28, Mar. 2, 4, 6, 8–9, 11, 13–14, 17, 19, 21, 23, 25, 27, 29, 31, Apr. 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, May 2, 4, 6, 8–11, 13, 15, 17, 19, 21, 23, 25, 27 to June 3, 26–30; discharge interpolated.

Monthly discharge of Medicine Bluff Creek near Lawton, Okla., for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
November	1,250	3	120	7,140
December 29	333	2.6	95.8	5,890
January	375	1.7	46.9	2,880
February	228	2.6	48.7	2,700
March	200	5.0	45.2	2,780
April	440	45	213	12,700
May	145	5	42	2,580
June	1,100	18	186	11,100
July	255	5	50.9	3,130
August	34	5	14.4	885
September	34	12	13.5	803
The period	.....	.....	.....	52,600

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LITTLE MEDICINE BLUFF CREEK NEAR LAWTON, OKLA.

LOCATION.—150 feet below west line of sec. 18, T. 3 N., R. 12 W., half a mile above mouth of creek, and 12½ miles northwest of Lawton, Comanche County.

DRAINAGE AREA.—About 10 square miles.

RECORDS AVAILABLE.—November 26, 1912, to September 30, 1919, when station was discontinued.

GAGE.—Vertical staff on left bank half a mile above mouth of creek; read by Sergeant W. E. Kidd, United States Army. Upstream 200 feet is a gage referred to same datum, which is read by observer during flood to determine slope between it and regular gage.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Bed composed of ledge rock overlain with sand. Control is rock ledge just below gage. Between station and crest of small dam on Medicine Bluff Creek just below Little Medicine Bluff Creek there is a fall of about 8 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.85 feet at noon October 26 (discharge, 200 second-feet). No flow November 10–13.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent; not affected by ice. Rating curve well defined. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records roughly approximate because the accuracy of the gage heights is uncertain.

Daily discharge, in second-feet, of Little Medicine Bluff Creek near Lawton, Okla., for the year ending Sept. 30, 1919.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.5	0.4	0.1	2.7	0	2.3	3.0	1.3	3.0	5.5	3.0	0.4
2	.5	.3	.1	3.5	11	2.2	3.0	1.3	3.0	5.5	3.0	.4
3	.5	.2	.1	3.0	3.5	1.6	3.0	1.3	3.0	5.5	3.0	.4
4	.5	.1	.1	2.8	2.0	1.3	5.5	1.3	3.0	5.5	3.0	.4
5	.5	.1	.1	2.7	1.3	1.3	9.0	1.3	3.0	5.5	3.0	.4
6	.5	.1	.1	2.3	.9	.8	9.0	1.3	3.0	5.5	3.0	.4
7	.5	17	.1	2.3	.6	.8	5.5	1.3	3.0	5.5	3.0	.4
8	1.0	4.2	.1	1.8	.3	1.3	7.2	3.0	3.0	5.5	3.0	.4
9	15	.1	.1	1.2	.1	1.6	9.0	3.0	3.0	5.5	3.0	.4
10	19	0	.1	1.1	.1	1.3	15	3.0	5.5	5.5	3.0	.4
11	1.0	0	.1	.8	.1	.8	15	3.0	5.5	5.5	1.3	.4
12	.5	0	.1	.5	.1	1.5	15	3.0	5.5	5.5	1.3	.4
13	.5	0	.1	.3	.1	1.6	9.0	3.0	5.5	3.0	1.3	.4
14	.5	.1	.1	2.0	.1	4.2	9.0	3.0	5.5	3.0	1.3	.4
15	.5	.1	.1	3.0	.1	3.0	9.0	3.0	5.5	3.0	1.3	.4
16	.5	.1	.1	2.2	.1	3.0	9.0	3.0	5.5	3.0	1.3	.4
17	.5	.1	.1	1.1	.1	2.7	5.5	3.0	5.5	4.2	1.3	.4
18	.5	.1	.3	.9	.1	2.2	3.0	3.0	5.5	5.5	1.3	.4
19	.5	.1	14	.8	.1	1.3	3.0	3.0	5.5	5.5	1.3	.4
20	.5	.1	1.6	.7	7.6	1.3	3.0	3.0	5.5	5.5	.4	.4
21	.5	.1	.4	.4	1.3	1.3	3.0	3.0	5.5	5.5	.4	.4
22	40	.1	.2	.4	21	1.3	1.3	3.0	5.5	5.5	.4	.4
23	6.2	.1	17	.3	8.3	1.3	1.3	3.0	5.5	5.5	.4	.4
24	1.0	.1	10	.2	3.0	1.6	1.3	3.0	5.5	5.5	.4	.4
25	1.0	.1	6.2	.2	2.0	3.0	1.3	3.0	5.5	5.5	.4	.4
26	153	.1	5.2	.1	4.2	3.0	1.3	3.0	5.5	5.5	.4	.4
27	45	.1	3.5	.9	3.0	2.3	1.3	3.0	5.5	5.5	.4	.4
28	4.8	.1	2.8	.3	2.7	1.3	1.3	3.0	5.5	5.5	.4	.4
29	1.0	.1	2.8	.1	.....	1.3	1.3	3.0	5.5	5.5	.4	.4
30	.5	.1	2.7	.1	.....	3.0	1.3	3.0	5.5	5.5	.4	.4
31	.5	.....	3.8	.1	.....	3.0	.....	3.0	.....	5.5	.4	.....

NOTE.—No gage-height record Oct. 1-8, 11-21, 24-25, 29 to Nov. 6, Nov. 10 to Dec. 17, Feb. 11-19, Sept. 29-30; discharge estimated.

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Monthly discharge of Little Medicine Bluff Creek near Lawton, Okla., for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	153	0.5	9.60	590
November	17	0	.81	48
December	17	.1	2.33	143
January	3.5	.1	1.25	77
February	21	.0	2.64	147
March	4.2	.8	1.89	116
April	15	1.3	5.48	326
May	3	1.3	2.62	161
June	5.5	3.0	4.75	283
July	5.5	3.0	5.14	316
August	3.0	.4	1.50	92
September	.4	.4	.40	24
The year	153	0	3.21	2,330

MISCELLANEOUS DISCHARGE MEASUREMENTS.

Miscellaneous measurements in Red River drainage basin during the year ending Sept. 30, 1919.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Aug. 8	Red River	Mississippi River	Highway bridge ½ mile below Missouri, Kansas & Texas Ry. bridge and U. S. Weather Bureau gage, 5 miles north of Denison, Tex.	3.4	1,300

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ALBERT B. FALL, Secretary

UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

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WATER-SUPPLY PAPER 508

SURFACE WATER SUPPLY OF THE UNITED STATES

1919-1920

PART VIII. WESTERN GULF OF MEXICO BASINS

NATHAN C. GROVER, Chief Hydraulic Engineer
C. E. ELLSWORTH, District Engineer

Prepared in cooperation with the
STATE OF TEXAS

WASHINGTON
GOVERNMENT PRINTING OFFICE
1922

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SURFACE WATER SUPPLY OF WESTERN GULF OF MEXICO BASINS, 1919-1920.

AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of 14 reports presenting results of measurements of flow made on streams in the United States during the biennium ending September 30, 1920.

The data presented in these reports were collected by the United States Geological Survey under the following authority contained in the organic law (20 Stat. L., p. 394):

> *Provided*, That this officer [the Director] shall have the direction of the Geological Survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

The work was begun in 1886 in connection with special studies relating to irrigation in the arid west. Since the fiscal year ending June 30, 1895, successive sundry civil bills passed by Congress have carried the following item and appropriations:

> For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

Annual appropriations for the fiscal years ended June 30, 1895–1921.

1895	$12,500.00
1896	20,000.00
1897 to 1900, inclusive	50,000.00
1901 to 1902, inclusive	100,000.00
1903 to 1906, inclusive	200,000.00
1907	150,000.00
1908 to 1910, inclusive	100,000.00
1911 to 1917, inclusive	150,000.00
1918	175,000.00
1919	148,244.10
1920	175,000.00
1921	180,000.00

In the execution of the work many private and State organizations have cooperated either by furnishing data or by assisting in collecting data. Acknowledgments for cooperation of the first kind are made in connection with the description of each station affected; cooperation of the second kind is acknowledged on page 5.

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Measurements of stream flow have been made at about 5,000 points in the United States and also at many points in Alaska and the Hawaiian Islands. In July, 1920, 1,350 gaging stations were being maintained by the Survey and the cooperating organizations. Many miscellaneous discharge measurements were made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in water-supply papers from time to time.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those that represent a rate of flow, as second-feet, gallons per minute, miner's inches, and discharge in second-feet per square mile, and (2) those that represent the actual quantity of water, as run-off in inches, acre-feet, and millions of cubic feet. The principal terms used in this series of reports are second-feet, second-feet per square mile, run-off in inches, and acre-feet. They may be defined as follows:

"Second-feet" is an abbreviation for "cubic feet per second." A second-foot is the rate of discharge of water flowing in a channel of rectangular cross section 1 foot wide and 1 foot deep at an average velocity of 1 foot per second. It is generally used as a fundamental unit from which others are computed.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off in inches" is the depth to which an area would be covered if all the water flowing from it in a given period were uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

An "acre-foot," equivalent to 43,560 cubic feet, is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation.

The following terms not in common use are here defined:

"Stage-discharge relation," an abbreviation for the term "relation of gage height to discharge."

"Control," a term used to designate the section or sections of the stream below the gage which determines the stage-discharge relation at the gage. It should be noted that the control may not be the same section or sections at all stages.

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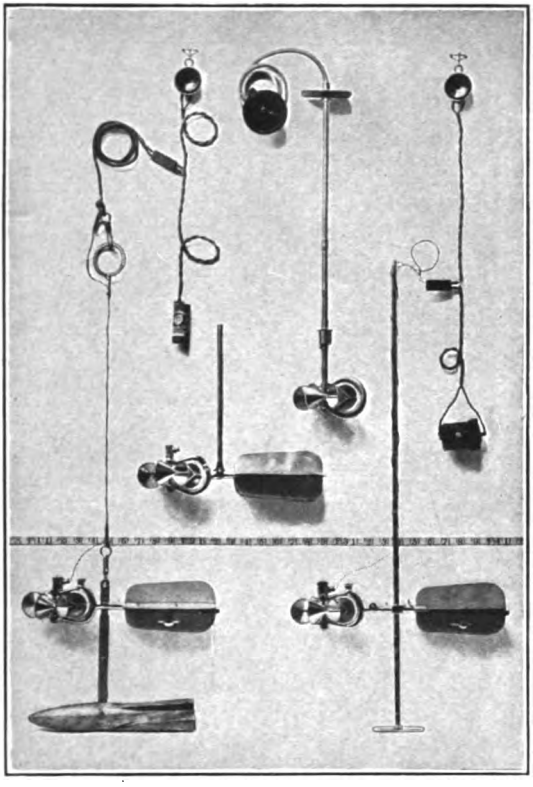
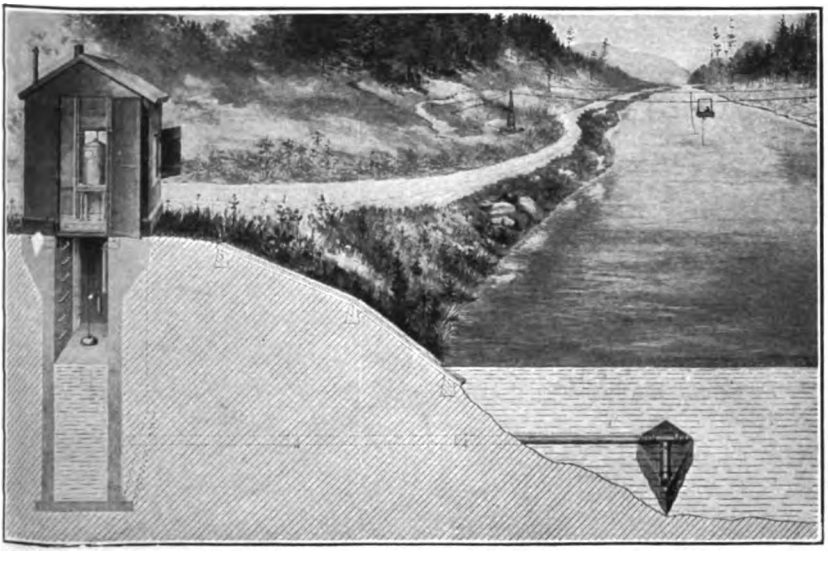


A. PRICE CURRENT METERS.



B. TYPICAL GAGING STATION.

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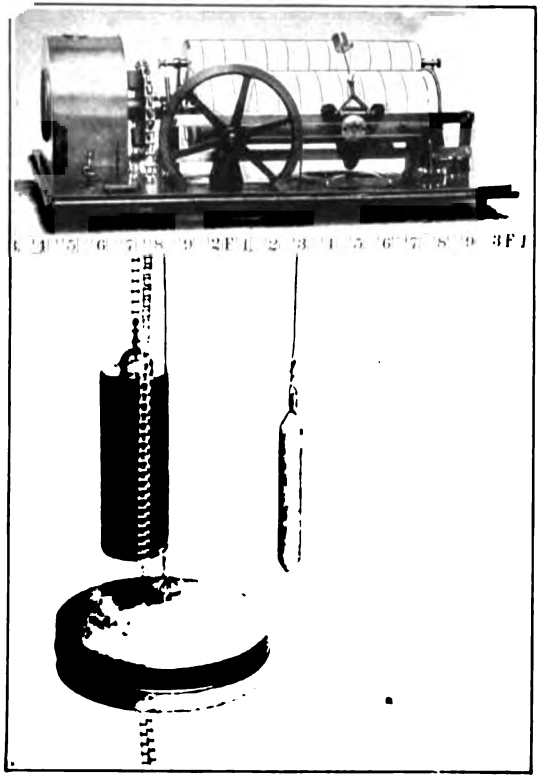
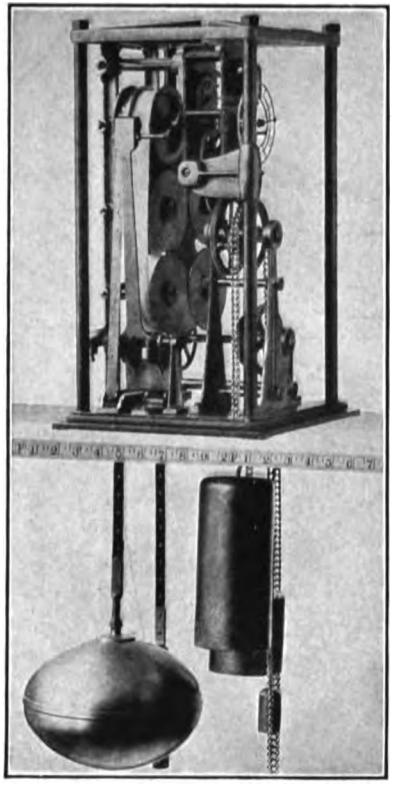
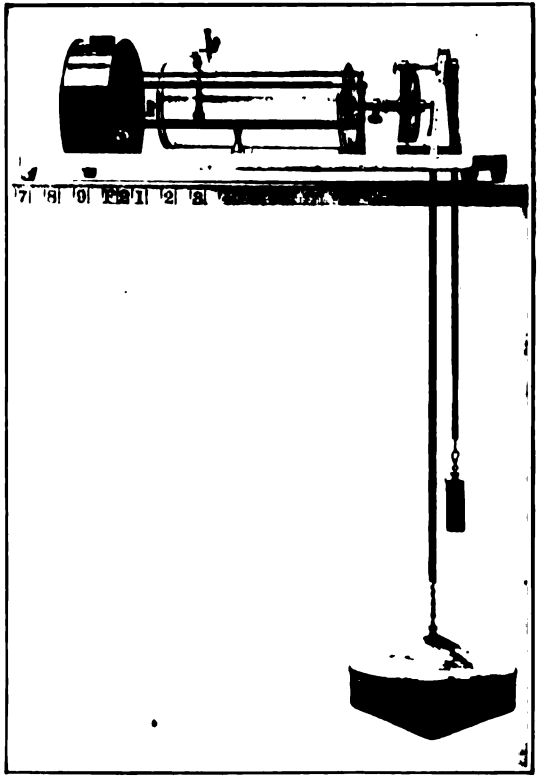


A. STEVENS CONTINUOUS.



B. GURLEY PRINTING.



C. FRIEZ.

WATER-STAGE RECORDERS.

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The "point of zero flow" for a gaging station is that point on the gage—the gage height—to which the surface of the water falls when the discharge of the stream is reduced to zero.

EXPLANATION OF DATA.

The data presented in this report cover the biennium beginning October 1, 1918, and ending September 30, 1920. At the beginning of January in most parts of the United States much of the precipitation in the preceding three months is stored as ground water in the form of snow or ice, or in ponds, lakes, and swamps, and this stored water passes off in the streams during the spring break-up. At the end of September, on the other hand, the only stored water available for run-off is possibly a small quantity in the ground; therefore the run-off for the year beginning October 1 is practically all derived from precipitation within that year.

The base data collected at gaging stations consist of records of stage, measurements of discharge, and general information used to supplement the gage heights and discharge measurements in determining the daily flow. The records of stage are obtained either from direct readings on a staff gage or from a water-stage recorder that gives a continuous record of the fluctuations. Measurements of discharge are made with a current meter. (See Pls. I, II.) The general methods are outlined in standard textbooks on the measurement of river discharge.

From the discharge measurements rating tables are prepared that give the discharge for any stage, and these rating tables, when applied to gage heights, give the discharge from which the daily, monthly, and yearly mean discharge is determined.

The data presented for each gaging station in the area covered by this report comprise a description of the station, a table giving results of discharge measurements, a table showing the daily discharge of the stream, and a table of monthly and yearly discharge and run-off.

If the base data are insufficient to determine the daily discharge, tables giving daily gage heights and results of discharge measurements are published.

The description of the station gives, in addition to statements regarding location and equipment, information in regard to any conditions that may affect the constancy of the stage-discharge relation, covering such subjects as the occurrence of ice, the use of the stream for log driving, shifting of control, and the cause and effect of backwater; it gives also information as to diversions that decrease the flow at the gage, artificial regulation, maximum and minimum recorded stages, and the accuracy of the records.

The table of daily discharge gives, in general, the discharge in second-feet corresponding to the mean of the gage heights read each

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day. At stations on streams subject to sudden or rapid diurnal fluctuation the discharge obtained from the rating table and the mean daily gage height may not be the true mean discharge for the day. If such stations are equipped with water-stage recorders the mean daily discharge may be obtained by averaging discharge at regular intervals during the day, or by using the discharge integrator, an instrument operating on the principle of the planimeter and containing as an essential element the rating curve of the station.

In the table of monthly discharge the column headed "Maximum" gives the mean flow for the day when the mean gage height was highest. As the gage height is the mean for the day it does not indicate correctly the stage when the water surface was at crest height, and the corresponding discharge was consequently larger than given in the maximum column. Likewise, in the column headed "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this average flow computations recorded in the remaining columns, which are defined on pages 2 and 3, are based.

The deficiency table presented for some of the gaging stations shows the number of days in each year on which the mean daily discharge was less than the discharge given in the table. By subtraction the table gives the number of days each year that the mean daily discharge was between the discharges given in the table and, also by subtraction, the number of days that the mean daily discharge was equal to or greater than the discharge given.

ACCURACY OF FIELD DATA AND COMPUTED RESULTS.

The accuracy of stream-flow data depends primarily (1) on the permanence of the stage–discharge relation and (2) on the accuracy of observation of stage, measurements of flow, and interpretation of records.

A paragraph in the description of the station or footnotes added to the tables gives information regarding the (1) permanence of the stage-discharge relation, (2) precision with which the discharge rating curve is defined, (3) refinement of gage readings, (4) frequency of gage readings, and (5) methods of applying daily gage heights to the rating table to obtain the daily discharge.[1]

For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The monthly means for any station may represent with high accuracy the quantity of water flowing past the gage, but the figures

[1] For a more detailed discussion of the accuracy of stream-flow data see Grover, N. C., and Hoyt, J. C., Accuracy of stream-flow data: U. S. Geol. Survey Water-Supply Paper 400, pp. 53–59, 1916.

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showing discharge per square mile and run-off in inches may be subject to gross errors caused by the inclusion of large noncontributing districts in the measured drainage area, by lack of information concerning water diverted for irrigation or other use, or by inability to interpret the effect of artificial regulation of the flow of the river above the station. "Second-feet per square mile" and "run-off in inches" are therefore not computed if such errors appear probable. The computations are also omitted for stations on streams draining areas in which the annual rainfall is less than 20 inches. All figures representing "second-feet per square mile" and "run-off in inches" previously published by the Survey should be used with caution because of possible inherent sources of error not known to the Survey.

Many gaging stations on streams in the irrigated areas of the United States are located above most of the diversions from those streams, and the discharge recorded does not show the water supply available for further development as prior appropriations below the stations must first be satisfied. To give an idea of the amount of prior appropriations, a paragraph on diversions is presented in each station description. The figures given can not be considered exact but represent the best information available.

The table of monthly discharge gives only a general idea of the flow at the station and should not be used for other than preliminary estimates; the tables of daily discharge allow more detailed studies of the variation in flow. It should be borne in mind, however, that the observations in each succeeding year may be expected to throw new light on data previously published.

COOPERATION.

The work of measuring streams in Texas during the two years ending September 30, 1920, was carried on in cooperation with the State through the Board of Water Engineers, consisting of W. T. Potter, chairman; C. S. Clark; and John A. Norris, to whom special acknowledgments are due for the efficient and cordial manner in which they represented the State in the cooperative investigations.

Acknowledgments are due the United States Reclamation Service for records furnished and general assistance at the stations on Pecos River and Rio Grande in New Mexico, and to the United States Weather Bureau for climatologic data and equipment for the evaporation station near Austin.

The cities of Corpus Christi, Waco, and San Antonio; Wharton County; the Imperial Irrigation Co.; the Markham Irrigation Co.; the Garwood Irrigation Co.; the Lakeside Irrigation Co.; the Wharton County Association; the Pierce estate; the Texas & Pacific Railway; and the Pecos Valley Lines have aided in the collection of records by furnishing funds, or giving general assistance.

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DIVISION OF WORK.

The data for stations in Texas and southeastern New Mexico, in the Rio Grande basin, were collected and prepared for publication under the direction of C. E. Ellsworth, district engineer, assisted by Clarence E. McCashin, Russell J. Hank, Donald A. Dudley, Harvey B. Kinnison, Edward P. Congdon, Andrew K. Gowans, Trigg Twichell, L. D. Snow, Robert G. West, H. C. Pritchett, John E. Powers, and Kate Casparis.

The manuscript was assembled and reviewed by B. J. Peterson and V. B. Lamoureux.

GAGING-STATION RECORDS.

TRINITY RIVER BASIN.

WEST FORK OF TRINITY RIVER AT BRIDGEPORT, TEX.[2]

LOCATION.—At suspension bridge on Balsora-Bridgeport road, half a mile southwest of center of Bridgeport, Wise County, a quarter of a mile above Chicago, Rock Island & Gulf Railway Co.'s pumping plant, and 1 mile below mouth of Gentry Creek.

DRAINAGE AREA.—1,060 square miles (measured on standard topographic maps; post-route map; and topographic map of Texas, compiled in 1899 by Robert T. Hill, of United States Geological Survey; scale, 1 inch=25 miles).

RECORDS AVAILABLE.—October 1, 1914, to September 30, 1920. Records of stage have been obtained by United States Weather Bureau from August 16, 1908, to October 16, 1915.

GAGE.—Weight and tape gage of the Mott type, fastened to downstream side of bridge 56 feet from north end of guard rail; read by Mrs. U. E. Byers.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of clay, gravel, and sand. Banks are high, slightly wooded, and are overflowed at a stage of 25 feet. Channel straight above and below station for 100 feet. Control is rock outcrop three-quarters of a mile below station.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 20.00 feet at 6 p. m. December 23 (discharge, 7,550 second-feet); no flow, October 4–18, June 17–21, August 5–16, and September 15–18.

Maximum stage recorded during year ending September 30, 1920, 23.77 feet at 7 a. m. May 16 (discharge, 12,200 second-feet); minimum stage 0.77 foot at 7 a. m. June 17 (discharge, 0.6 second-foot).

1908–1920: Maximum stage recorded 28.9 feet June 8, 1915 (discharge not determined); no flow during several periods.

ICE.—None reported.

DIVERSIONS.—Practically the only diversion above station is by city of Bridgeport which diverts a small amount for municipal uses.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent except for slight changes during floods. Rating curve well defined below 11,000 second-feet. Gage read to hundredths once daily and oftener during floods. Daily discharge ascertained by applying mean daily gage height to rating table, except October 6, 1918, to February 4, 1919, when indirect method for shifting control was used. Records good.

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[2] Published in earlier reports as Trinity River at Bridgeport, Tex.

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Discharge measurements of West Fork of Trinity River at Bridgeport, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.				1919.			
Oct. 4	McCashin and Congdon	*Ft.*	*Sec.-ft.* 0	Dec. 3	C. E. Ellsworth	*Ft.* 1.76	*Sec.-ft.* 31.6
1919.				1920.			
Jan. 8	A. K. Gowans	1.77	31.2	Feb. 17	D. A. Dudley	1.73	20.4
Mar. 21	C. E. Ellsworth	1.41	7.5	Aug. 20	C. E. Ellsworth	1.80	25.5
June 14	R. J. Hank	.75	[a] .5				

[a] Estimated.

Daily discharge, in second-feet, of West Fork of Trinity River at Bridgeport, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	1.0	376	18	127	1,070	19	413	7.0	140	213	0.7	310
2	.5	36	18	262	2,490	16	179	3.5	955	248	.4	179
3	.1	27	17	273	1,580	14	530	2.3	144	319	.2	25
4	0	18	16	257	768	12	277	1.7	73	47	.1	71
5	0	12	15	146	378	10	1,360	1.3	48	24	0	68
6	0	14	14	99	196	8.5	907	1.1	25	22	0	33
7	0	2,180	13	64	177	7.0	1,540	390	1.9	2.1	0	30
8	0	2,320	12	36	114	9.1	475	1,020	1.4	1.3	0	16
9	0	765	10	26	79	15	1,360	330	1.1	1.6	0	2.4
10	0	518	10	16	56	14	1,140	38	.8	1.5	0	1.3
11	0	45	9.4	14	45	7.0	288	150	.6	1.4	0	1.2
12	0	17	8.5	12	30	4.1	160	487	.5	1.2	0	1.7
13	0	38	7.3	17	24	1.9	140	782	.8	1.0	0	1.1
14	0	20	6.5	16	19	1.1	120	1,320	.5	1.0	0	1.3
15	0	15	5.8	16	16	.7	91	866	.4	5.8	0	0
16	0	12	4.5	20	13	34	84	465	.2	2.0	0	0
17	0	8.8	3.9	39	10	10	46	4,830	0	2.1	1.7	0
18	0	5.8	8.2	45	8.8	7.6	10	3,530	0	19	2.5	0
19	109	3.3	12	42	8.8	7.0	7.9	2,210	0	775	1.4	.2
20	9.4	7.0	561	34	25	5.8	6.0	1,680	0	624	1.6	2.2
21	2.7	13	1,320	28	19	4.8	5.5	859	0	308	1,400	18
22	595	12	746	1,120	33	3.7	4.1	465	321	46	310	321
23	85	11	2,720	1,420	30	2.5	2.9	156	489	30	26	818
24	681	10	2,990	787	28	160	2.3	102	192	12	30	87
25	667	8.8	2,430	292	34	1,190	2.0	549	301	7.6	43	323
26	1,710	17	1,860	164	30	595	1.5	3,510	392	6.0	17	140
27	1,660	90	1,260	1,170	26	417	366	2,460	47	4.8	6.0	15
28	2,030	136	295	907	24	355	16	1,020	7.0	3.3	2.3	13
29	2,830	42	60	1,140	.....	160	14	447	1.4	1.9	28	10
30	1,580	19	34	1,080	.....	1,170	10	306	8.5	1.3	32	8.8
31	928	.....	492	885	.....	969	.....	177	.....	1.1	43	.....

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Daily discharge, in second-feet, of West Fork of Trinity River at Bridgeport, Tex., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	26	782	30	8.8	28	7.0	4.5	67	25	6.0	4.1	470
2	11	332	28	8.2	24	6.5	4.1	26	23	3.5	1.7	344
3	30	181	24	8.8	22	5.8	3.5	12	14	2.3	120	194
4	3.1	185	19	8.2	21	4.5	2.7	9.4	7.3	1.8	22	638
5	2.0	108	16	8.5	20	4.1	2.5	5,410	22	1.4	16	179
6	1.8	79	12	15	19	3.5	2.4	9,200	73	91	12	447
7	566	175	9.4	30	18	2.9	2.4	8,720	31	321	7.3	4,460
8	5,490	518	6.8	288	17	2.5	2.3	2,900	23	111	4.3	4,040
9	3,700	662	4.5	266	16	2.5	4.5	854	16	30	5.8	7,640
10	2,280	390	2.7	61	24	2.4	6.0	2,520	12	494	213	4,730
11	2,030	266	2.1	244	16	2.3	35	3,950	7.9	424	344	2,140
12	1,650	332	1.9	223	12	2.1	25	9,080	5.8	378	1,240	1,170
13	1,020	710	1.7	200	10	1.9	23	5,660	3.1	310	2,520	518
14	321	196	1.5	111	8.2	1.8	12	2,060	1.8	185	1,470	158
15	181	133	1.4	53	7.0	1.8	7.6	3,340	1.3	133	662	72
16	112	106	1.3	55	6.0	1.7	7.0	11,600	.9	120	332	96
17	198	93	1.0	43	8.8	1.5	6.0	4,610	.6	100	102	60
18	401	67	.8	35	2.0	1.8	4.5	1,650	299	6.5	35	43
19	401	55	1.7	29	1.5	1.9	3.7	854	4,510	638	32	34
20	367	41	1.5	27	1.3	2.0	2.9	470	2,450	470	26	25
21	2,620	29	1.2	25	1.1	1.9	2.4	192	494	390	19	23
22	3,340	22	1.4	30	1.0	1.9	2.3	158	1,070	183	16	22
23	3,260	16	1.6	65	.9	1.8	2.1	135	5,270	213	14	19
24	2,310	10	1.7	91	.9	2.0	5.0	114	424	80	11	16
25	1,020	7.0	1.9	806	.8	2.4	277	96	33	41	14	15
26	191	74	2.0	614	2.5	11	181	86	23	34	1,590	14
27	183	74	2.1	288	4.8	25	174	79	19	28	3,380	12
28	266	24	2.0	144	7.0	16	244	62	16	25	2,340	11
29	518	22	1.9	66	7.9	9.4	321	54	13	21	1,650	8.8
30	244	31	7.3	38	.....	7.0	61	41	8.5	14	1,050	8.5
31	185	.....	11	35	.....	5.5	.....	29	.....	10	590	.....

NOTE.—Oct. 1-4, 1918, gage removed for repairs; records partly estimated. Gage reading Sept. 19, 1919, n error; discharge interpolated.

Monthly discharge of West Fork of Trinity River at Bridgeport, Tex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	2,830	0	416	25,600
November	2,320	3.3	227	13,500
December	2,990	3.9	483	29,700
January	1,420	12	340	20,900
February	2,490	8.8	262	14,600
March	1,190	.7	169	10,400
April	1,540	1.5	319	19,000
May	4,830	1.1	909	55,900
June	955	0	105	6,250
July	775	1.0	88.2	5,420
August	1,400	0	62.8	3,860
September	818	0	83.2	4,950
The year	4,830	0	290	210,000
1919–20.				
October	5,490	1.8	1,060	65,200
November	782	7.0	190	11,300
December	30	.8	6.50	400
January	806	8.2	127	7,810
February	28	.8	10.6	610
March	25	1.5	4.66	287
April	321	2.1	47.7	2,840
May	11,600	9.4	2,390	147,000
June	5,270	.6	497	29,600
July	494	1.4	157	9,650
August	3,380	1.7	576	35,400
September	7,640	8.5	920	54,700
The year	11,600	.6	502	365,000

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BRAZOS RIVER BASIN.

BRAZOS RIVER NEAR GRAHAM, TEX.

LOCATION.—At two-span steel highway bridge on Murray road, 6 miles above mouth of Clear Fork and 10 miles west of Graham, Young County.

DRAINAGE AREA.—12,900 square miles (measured on post-route map, and topographic map of Texas, compiled in 1899 by Robert T. Hill, of the United States Geological Survey; scale, 1 inch=25 miles).

RECORDS AVAILABLE.—November 13, 1915, to March 25, 1920, when station was discontinued.

GAGE.—Vertical staff on left downstream corner of middle pier; read by Mrs. John Timmons.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge or by wading.

CHANNEL AND CONTROL.—Channel straight above and below station. Bed composed of sand and clay and is free from vegetation; shifting. Left bank high and not subject to overflow; right bank is of medium height and is overflowed during high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 15.55 feet at 4 p. m. November 2 (discharge not determined); no flow October 8.

Maximum stage recorded during year ending September 30, 1920, 9.98 feet at 10 a. m. October 12 (discharge not determined); minimum stage, 2.97 feet at 5 p. m. March 25 (discharge, 0.9 second-foot).

1916–1920: Maximum stage recorded, 15.55 feet at 4 p. m. November 2, 1919 (discharge not determined); no flow for several periods in 1916, 1917, and 1918, and for one day, October 8, 1919.

ICE.—None reported during year.

DIVERSIONS.—Records of the Board of Water Engineers for the State of Texas show that numerous diversions are made above station for mining, irrigation, and municipal uses, but total probably does not appreciably affect the flow except during low stages.

REGULATION.—None of consequence.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve poorly defined below 1,600 second-feet, and extended above. Gage read to hundredths once daily. Records poor. Daily discharge, which was determined by indirect method for shifting control is not considered sufficiently accurate to warrant publication.

Discharge measurements of Brazos River near Graham, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 5	McCashin and Congdon	4.03	[a] 0.5	Aug. 16	T. Twichell	3.99	46.1
				Dec. 4	C. E. Ellsworth	4.27	95.9
1919.				1920.			
Jan. 9	A. K. Gowans	4.30	99.3	Feb. 18	D. A. Dudley	3.82	38.9
Mar. 20	C. E. Ellsworth	3.43	5.4				
June 15	R. J. Hank	5.10	91.0				

[a] Estimated.

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Monthly discharge of Brazos River near Graham, Tex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	8,740	0	1,040	64,000
November	166	11	42.9	2,550
December	2,840	4.8	470	28,900
January	1,720	42	348	21,400
February	1,360	9.4	162	9,000
March	2,830	6.2	392	24,100
April	6,750	136	1,310	78,000
May	6,860	572	2,130	131,000
June	5,020	12	825	49,100
July	5,830	7.6	858	52,800
August	336	40	[a] 168	10,300
September 1–17	.....	9.1	[a] 23.5	792
The period	.....	.....	.....	472,000
1919–20.				
October 5–31	4,690	414	2,550	137,000
November	2,490	106	755	44,900
December	112	31	65	4,000
January	157	28	74	4,550
February	432	13	67	3,850
March 1–25	13	.9	5.4	267
The period	.....	.....	.....	195,000

[a] Partly estimated.

NOTE.—See "Accuracy" in station description. No record Sept. 18–30, 1919; mean discharge probably considerably greater than from Sept. 1–17, 1919.

BRAZOS RIVER AT BRAZOS, TEX.

LOCATION.—At Texas & Pacific Railway bridge half a mile northeast of Brazos, Palo Pinto County, and 1½ miles above mouth of Palo Pinto Creek.

DRAINAGE AREA.—20,200 square miles (measured on standard topographic map; post-route map; and topographic map of Texas, compiled in 1899 by Robert T. Hill, of the United States Geological Survey; scale, 1 inch=25 miles).

RECORDS AVAILABLE.—October 1, 1914, to April 30, 1920, when station was discontinued. Records of stage have been obtained by the United States Weather Bureau since August 16, 1908.

GAGE.—Vertical staff on northwest side of and 1 foot from upstream edge of pier nearest the middle of the railway bridge; graduations above 6 feet painted on pier; read by R. C. Lindsay.

DISCHARGE MEASUREMENTS.—Made from three-span highway bridge, about 600 feet below railway bridge, or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel; shifts considerably. Right bank high, rocky, wooded, and not subject to overflow; left bank composed of sand, gravel, and clay, wooded, and medium in height, and subject to overflow at high water. Channel straight above and below for several thousand feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 10.0 feet at 5 p. m. July 22 (discharge, determined from extension of rating curve, 31,100 second-feet); minimum flow for year estimated at somewhat less than 30 second-feet in March.

Maximum stage recorded during period October 1, 1919, to April 30, 1920, 6.5 feet at 8 a. m. October 22 (discharge, 11,100 second-feet); minimum stage, 0.4 foot, April 18–30 (discharge, 107 second-feet). Gage record unreliable, and these discharges subject to error.

1908–1920: Maximum stage recorded, 22.0 feet, May 24, 1908 (discharge not determined); no flow for several periods within period of record.

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ICE.—None reported during year.

DIVERSIONS.—Records of the Board of Water Engineers for the State of Texas show that numerous small diversions are made above station for mining, irrigation, and municipal uses, but total probably does not appreciably affect the flow except during low stages.

REGULATION.—None of consequence.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve fairly well defined below 19,000 second-feet. Gage read to half-tenths once daily to November 30, 1919, and to tenths thereafter; reliability doubtful. Records poor. Data inadequate to determine discharge after September 30, 1919.

Discharge measurements of Brazos River at Brazos, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 2	McCashin and Congdon	1.60	68.7	Aug. 14	T. Twichell	2.48	656
1919.				Dec. 6	C. E. Ellsworth	1.21	212
Jan. 7	A. K. Gowans	1.82	321	1920.			
Mar. 19	C. E. Ellsworth	.68	30.1	Feb. 20	D. A. Dudley	.47	124
June 10	R. J. Hank	1.89	383				

Daily gage height, in feet, of Brazos River at Brazos, Tex., for the period Oct. 1, 1919, to Apr. 30, 1920.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.
1919-20.							1919-20.						
1	2.2	4.8	1.70	.....	0.9	0.6	16	4.1	2.4	.....	.....	.6	.5
2	2.1	4.6	1.70	.....	.8	.6	17	3.35	2.4	.....	.....	.6	.5
3	2.1	4.4	1.70	.....	.8	.6	18	2.55	2.3	.....	.....	.6	.4
4	2.1	4.2	1.70	.....	.8	.6	19	3.55	2.2	.....	.....	.6	.4
5	2.1	4.0	1.70	.....	.8	.6	20	3.5	2.15	.....	0.47	.6	.4
6	2.0	3.3	1.20	.....	.8	.6	21	3.5	2.1	.....	.....	.6	.4
7	2.0	2.9	.....	.....	.8	.6	22	6.5	2.1	.....	.....	.6	.4
8	2.0	2.4	.....	.....	.7	.6	23	6.2	1.70	.....	.....	.6	.4
9	1.9	2.4	.....	.....	.7	.6	24	5.2	1.50	.....	.....	.6	.4
10	1.9	2.4	.....	.....	.7	.6	25	5.0	1.50	.....	.....	.8	.4
11	5.4	2.3	.....	.....	.7	.6	26	3.15	1.65	.....	.....	.6	.4
12	5.7	2.25	.....	.....	.65	.5	27	3.1	1.80	.....	.....	.6	.4
13	5.4	2.15	.....	.....	.6	.5	28	2.9	1.80	.....	.....	.6	.4
14	5.2	2.4	.....	.....	.6	.5	29	2.8	1.90	.....	.....	.6	.4
15	4.8	2.55	.....	.....	.6	.5	30	5.4	1.70	.....	.....	.6	.4
							31	5.6	.....	.....	.....	.6	.....

NOTE.—No record Dec. 7, 1919, to Feb. 19, 1920, and Feb. 21-29, 1920.

Monthly discharge of Brazos River at Brazos, Tex., for the year ending Sept. 30, 1919

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	15,100	34	2,600	160,000
November	13,000	375	1,740	104,000
December	15,200	252	1,680	103,000
January	5,630	238	976	60,000
February	4,730	88	1,020	56,600
March	10,900	.....	1,060	65,200
April	14,000	151	2,990	178,000
May	22,500	1,080	7,520	462,000
June	9,520	390	2,470	147,000
July	24,500	137	3,390	208,000
August	9,700	174	1,350	83,000
September	2,540	34	548	32,600
The year	24,500	.....	2,300	1,660,000

NOTE.—Determination of daily discharge not sufficiently accurate to warrant publication.

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BRAZOS RIVER AT WACO, TEX.

LOCATION.—At Southern Traction Co.'s bridge just above suspension bridge on Bridge Street, Waco, McLennan County, 2½ miles below mouth of Bosque River, 4½ miles above mouth of Cottonwood Creek, and 9 miles above lock No. 8.

DRAINAGE AREA.—25,500* square miles (measured on standard topographic maps: post-route map; and topographic map of Texas, compiled in 1899 by Robert T. Hill, of United States Geological Survey; scale, 1 inch=25 miles).

RECORDS AVAILABLE.—September 14, 1898, to December 31, 1911; October 1, 1914, to September 30, 1920. Records of stage have been obtained by United States Weather Bureau since August 9, 1900.

GAGE.—Gurley graph water-stage recorder installed March 29, 1918, on downstream side of pier of Southern Traction Co.'s bridge, 100 feet upstream from suspension bridge, inspected by Manton Hannah. Gage used from September 14, 1898, to February 29, 1908, was an inclined staff under left end of suspension bridge. From March 1, 1908, to December 31, 1911, and October 1, 1914, to December 5, 1917, record was obtained from a chain gage on downstream side of suspension bridge. From December 6, 1917, to March 28, 1918, gage was a vertical staff, painted on downstream side of pier of Southern Traction Co.'s bridge, the present location of the Gurley recorder. In 1902, a gage was marked off on the north pier of a new single-span highway bridge 300 feet above suspension bridge, and was used for high-water readings. From August 9, 1900, to May 21, 1903, the United States Weather Bureau used a vertical gage painted on pier nearest the center of the Saint Louis, Southwestern Railway bridge. From September 25, 1914, to March 23, 1915, during reconstruction of suspension bridge, the chain gage was on one-span highway bridge 300 feet upstream. All gages were installed at same datum, but readings probably differ slightly because of differences in location.

DISCHARGE MEASUREMENTS.—Made from upstream side of first one-span highway bridge above gage.

CHANNEL AND CONTROL.—Bed composed of sand and gravel; shifts. Banks are clay, medium in height, have been improved by the city, and are overflowed at extremely high stages. Channel straight above and below for several thousand feet. Position of control not known.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 36.4 feet at 4 a. m. November 9 (discharge, 125,000 second-feet); minimum stage from water-stage recorder, 4.68 feet at 6 p. m. October 16, and 1 p. m. October 17 (discharge, 73 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 27.9 feet at 5 a. m. October 23 (discharge, 78,100 second-feet); minimum stage from water-stage recorder, 4.96 feet from 7 a. m. May 4 to 4 a. m. May 5 (discharge, 470 second-feet).

1898–1920: Maximum stage recorded, 39.7 feet December 3, 1913 (discharge not determined); no flow August 20–21, 1918.

ICE.—None reported during year.

DIVERSIONS.—Records of the Board of Water Engineers for the State of Texas show that numerous small diversions are made above station for mining, irrigation, and municipal uses, but total probably does not appreciably affect the flow except during low stages.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve fairly well defined below 30,000 second-feet; above 30,000 second-feet curve based on one discharge measurement at discharge of 109,000 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge determined by shifting-control method. Records good after July 29, 1919, because of more frequent measurements, and poor prior to that date.

* Revised since publication of Water-Supply Paper 308.

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Daily discharge, in second-feet, of Brazos River at Waco, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	2,520	13,500	7,100	1,380	3,580	1,440	1,390	527	3,880	2,500	566	7,350
2	2,300	16,400	5,860	1,220	3,500	1,380	2,680	511	3,500	2,020	554	7,850
3	2,020	10,100	4,900	1,080	3,220	1,370	2,340	490	8,650	1,720	594	6,760
4	1,740	7,600	4,500	1,070	3,000	1,460	1,600	475	6,310	1,480	554	6,990
5	1,570	5,410	4,400	1,760	2,780	1,290	1,330	606	3,500	2,050	696	5,520
6	1,450	4,800	4,500	15,800	2,690	1,320	1,160	3,760	3,420	1,850	6,310	4,100
7	1,370	8,100	4,100	9,200	2,620	1,290	1,150	19,500	2,690	1,760	7,980	40,400
8	6,090	33,800	3,800	13,100	2,600	1,370	1,120	28,100	1,980	1,750	4,900	45,500
9	7,850	31,100	3,420	7,850	2,520	1,380	1,120	21,000	1,630	2,450	2,680	43,400
10	6,540	48,600	3,280	4,020	2,420	1,450	1,090	24,100	1,420	3,200	1,840	36,100
11	35,600	23,300	2,900	6,990	2,660	1,460	1,090	41,400	1,350	2,360	1,850	21,800
12	16,400	10,100	2,900	23,300	4,300	1,380	1,010	37,500	1,210	1,450	1,460	16,400
13	11,300	8,380	2,820	11,300	4,700	1,310	974	28,600	1,250	1,270	6,760	12,500
14	8,920	10,400	2,640	6,990	3,680	1,240	962	15,100	1,430	1,110	6,990	8,920
15	12,500	8,100	2,300	5,980	2,990	1,180	966	16,800	1,250	1,460	8,100	6,760
16	17,800	6,540	2,220	5,980	2,600	1,130	882	26,100	1,170	1,090	5,410	5,410
17	34,300	5,750	2,330	5,300	2,480	1,100	845	34,300	1,060	890	11,000	4,700
18	14,100	5,100	2,240	4,200	2,540	1,080	815	37,100	990	772	6,310	3,880
19	8,100	4,400	2,520	3,720	2,440	1,050	751	30,700	1,110	667	6,650	3,200
20	6,090	3,880	2,700	3,420	2,320	1,030	716	17,800	3,600	793	9,200	2,750
21	5,000	3,500	2,390	3,200	2,220	974	654	15,100	22,900	1,090	12,800	2,300
22	39,900	3,050	2,130	3,120	2,100	928	624	14,800	20,000	1,280	21,400	2,160
23	64,400	2,750	2,010	9,200	2,010	905	600	12,500	13,500	1,010	13,500	2,020
24	27,300	2,450	1,920	10,100	1,970	928	600	7,600	14,400	1,250	13,100	1,750
25	14,100	2,380	1,830	6,650	1,870	5,640	618	5,000	17,500	1,570	26,500	1,560
26	9,500	8,920	1,730	5,100	1,790	14,800	612	4,020	8,650	1,120	15,100	1,430
27	8,100	4,700	1,670	4,700	1,720	4,700	600	3,420	6,420	1,050	11,000	1,310
28	5,980	13,800	1,640	4,400	1,620	2,980	583	3,200	4,900	765	13,100	1,220
29	4,900	34,700	1,580	4,130	1,570	2,160	549	2,600	3,800	681	8,650	1,120
30	4,020	11,300	1,480	3,850	.....	1,700	538	2,200	3,050	744	9,800	1,060
31	4,200	.....	1,440	3,580	.....	1,510	.....	2,980	.....	667	6,880	.....

NOTE.—Discharge, June 21–28, 1919, estimated 24,000 second-feet. Discharge interpolated, Aug. 11–18, 1919; Jan. 29, 30, 1920. Gage heights from U. S. Weather Bureau gage used for determining discharge June 19, 20, 22–25, 1920. Gage heights partly estimated Oct. 24–25, Nov. 9–10, Dec. 6–7, 1919; Jan. 31, Apr. 4–6, May 5–10, and Sept. 4, 1920.

Monthly discharge of Brazos River at Waco, Tex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	27,100	75	4,580	282,000
November	99,800	1,010	11,300	672,000
December	42,400	566	6,230	383,000
January	25,300	501	5,840	359,000
February	19,600	1,290	3,990	222,000
March	33,800	630	3,490	215,000
April	10,800	490	4,390	261,000
May	22,300	3,460	9,450	581,000
June	.....	950	9,470	564,000
July	23,600	716	5,270	324,000
August	28,300	912	4,430	272,000
September	39,100	381	5,360	319,000
The year	99,800	75	6,150	4,450,000
1919–20.				
October	64,400	1,370	12,400	762,000
November	48,600	2,380	11,800	702,000
December	7,100	1,440	2,940	181,000
January	23,300	1,070	6,180	380,000
February	4,700	1,570	2,640	152,000
March	14,800	905	2,080	125,000
April	2,680	538	1,000	59,500
May	41,400	475	14,800	910,000
June	22,900	990	5,550	330,000
July	3,200	667	1,420	87,300
August	26,500	554	7,810	480,000
September	45,500	1,060	10,200	607,000
The year	64,400	475	6,580	4,780,000

NOTE.—See footnote to table of daily discharge.

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Days of deficiency in discharge of Brazos River at Waco, Tex., for the years ending Sept. 30, 1901–1910 and 1915–1920.

Discharge in second-feet.	Days of deficient discharge.															
	1900–1	1901–2	1902–3	1903–4	1904–5	1905–6	1906–7	1907–8	1908–9	1909–10	1914–15	1915–16	1916–17	1917–18	1918–19	1919–20
100	34	76	1	14	.....	.....	.....	.....	203	144	.....	.....	91	208	3	.....
200	73	124	17	98	15	.....	1	2	260	220	.....	32	202	234	10	.....
300	115	141	33	125	63	16	17	20	287	246	4	76	234	247	13	.....
400	164	152	42	148	98	79	61	31	300	260	28	132	250	258	16	.....
500	199	163	71	181	126	106	102	43	307	282	38	164	260	263	22	2
600	220	177	98	202	136	130	131	56	310	293	42	177	270	267	31	11
700	242	192	130	215	141	145	153	65	314	294	49	189	277	273	43	23
800	256	206	168	239	153	160	179	73	315	305	53	198	288	278	51	29
900	266	222	184	254	161	168	220	97	317	310	67	211	294	284	61	33
1,000	274	235	192	260	164	172	233	109	317	314	83	218	307	289	68	41
1,200	288	250	217	280	184	196	265	153	326	322	124	231	319	292	99	67
1,400	296	265	230	286	195	210	271	183	328	329	152	247	332	308	118	91
1,600	299	279	243	298	214	233	290	218	335	336	176	258	338	313	131	111
1,800	301	292	256	300	227	242	298	232	340	338	199	265	342	316	147	126
2,000	306	302	259	304	233	249	302	250	341	341	204	273	346	320	159	134
2,500	314	314	274	313	245	279	317	274	345	347	223	287	350	329	175	162
3,000	326	323	293	322	252	297	325	291	348	348	245	298	353	329	189	187
4,000	337	327	320	333	274	315	338	307	353	350	277	317	356	337	214	217
5,000	345	337	332	344	291	322	347	318	356	351	294	327	362	342	241	241
6,000	349	342	339	349	308	335	354	325	358	352	306	335	363	345	250	256
7,000	352	346	342	354	314	340	355	329	358	355	314	342	364	348	258	274
8,000	354	350	348	356	320	343	357	333	360	357	316	344	364	352	273	282
9,000	357	351	352	357	329	347	358	335	360	357	321	347	364	352	289	294
10,000	358	352	354	360	331	352	359	337	360	357	326	352	364	355	301	299
15,000	361	357	359	364	343	359	365	343	360	362	339	357	365	363	329	324
20,000	363	359	361	365	354	361	.....	348	362	362	344	359	.....	365	338	336
40,000	365	361	365	366	362	364	.....	356	365	365	354	361	.....	.....	362	360
60,000	.....	363	.....	.....	364	365	.....	359	.....	.....	357	365	.....	.....	363	365
80,000	.....	365	.....	.....	364	.....	.....	360	.....	.....	361	365	.....	.....	363	366
100,000	.....	.....	.....	.....	365	.....	.....	363	.....	.....	365	366	.....	.....	365	.....
150,000	.....	.....	.....	.....	.....	.....	.....	366	.....	.....	.....	.....	.....	.....	.....	.....

BRAZOS RIVER NEAR COLLEGE STATION, TEX.

LOCATION.—At Jones' Bridge, 4 miles below Munson Shoals, 6 miles southwest of College Station, Brazos County, 19 miles above mouth of Yegua River, and 30 miles above mouth of Navasota River.

DRAINAGE AREA.—35,400 square miles (measured on standard topographic maps; post-route map, and topographic map of Texas compiled in 1899 by Robert T. Hill, of United States Geological Survey; scale, 1 inch=25 miles).

RECORDS AVAILABLE.—February 23, 1918, to September 30, 1920.

GAGE.—Vertical staff in two sections on fourth pier from right bank. Section 0 to 14 feet is attached to sheet piling around footing of pier. Section 14 to 52 feet is painted on same pier. Read by Will Reaves or Ed Phillips.

DISCHARGE MEASUREMENTS.—Made from bridge to which gage is attached.

CHANNEL AND CONTROL.—Bed composed of sand and mud; shifting. Location of control not known. Banks high and free from vegetation. Right bank subject to overflow at extremely high stages (about 40 feet).

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 41.0 feet at 8.30 a. m. November 11 (discharge, 69,300 second-feet, determined from extension of rating curve); minimum stage, 4.3 feet at 6 a. m. October 16, and 6 p. m. October 16 and 17 (discharge, 272 second-feet).

Maximum stage recorded during year ending September 30, 1920, 41.5 feet at 6 a. m. October 25 (discharge, 70,500 second-feet, determined from extension of rating curve); minimum stage, 6.2 feet at 9 a. m. August 1 (discharge, 945 second-feet).

1918–1920: Maximum stage recorded in 1920 (see above); minimum stage 3.75 feet September 4, 1918 (discharge, 92 second-feet).

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CLEAR FORK OF BRAZOS RIVER NEAR ELIASVILLE, TEX.

LOCATION.—At new suspension highway bridge 2½ miles northeast of Eliasville, Young County, 4½ miles southwest of South Bend, 6 miles above mouth of stream, and below all tributaries.

DRAINAGE AREA.—5,650 square miles (measured on standard topographic maps; post-route map; and topographic map of Texas, compiled in 1899 by Robert T. Hill, of United States Geological Survey; scale, 1 inch=25 miles).

RECORDS AVAILABLE.—November 12, 1915, to April 30, 1920, when station was discontinued.

GAGE.—Staff gage on left bank below bridge used for stages below 6.7 feet; chain gage on downstream side of bridge used for stages above 6.7 feet. Read by Gilmer Vaughn.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Banks high, wooded, composed of clay and gravel, and not subject to overflow. Bed composed of sand and gravel; free from vegetation. Channel straight above and below station. A shoal about 600 feet below station serves as control for low and medium stages; control shifts during changing stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 27.2 feet at 5.40 p. m. May 27 (discharge, 12,500 second-feet, determined from extension of rating curve); minimum stage, 2.90 feet October 8 (discharge, 1.6 second-feet).

Maximum stage recorded during year ending September 30, 1920, 10.9 feet at 5 p. m. October 21 (discharge, 2,800 second-feet); minimum stage, 2.90 feet from 8 a. m. April 24 to 8 a. m. April 26 (discharge, 1.4 second-feet).

1916–1920: Maximum stage recorded, 27.2 feet at 5.40 p. m. May 27, 1919 (discharge, 12,500 second-feet, determined from extension of rating curve); no flow for extended periods.

ICE.—None reported during year.

DIVERSIONS.—Records of the Board of Water Engineers for the State of Texas show that numerous small diversions are made above station for mining, irrigation, and municipal uses which probably reduce the flow considerably during low stages. Two diversions are made for irrigation between station and confluence of Clear Fork and Brazos River.

REGULATION.—None of consequence except possibly during extremely low stages.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve fairly well defined below 9,000 second-feet. Gage read to hundredths twice daily. Mean of two daily gage readings during low stages may not be true index of mean daily flow because of regulation for power above station. Daily discharge ascertained by indirect method for shifting control. Records fair.

Discharge measurements of Clear Fork of Brazos River near Eliasville, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
1918.				1919.			
Oct. 5	McCashin and Congdon	3.06	4.3	Aug. 16	T. Twichell	3.71	39.0
				Dec. 4	C. E. Ellsworth	3.50	25.1
1919.				1920.			
Jan. 9	A. K. Gowans	3.48	21.6	Feb. 18	D. A. Dudley	3.60	32.1
Mar. 20	C. E. Ellsworth	3.26	5.4				
June 15	R. J. Hank	4.52	229				

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Daily discharge, in second-feet, of Clear Fork of Brazos River near Eliasville, Tex., for the period Oct. 1, 1918, to Apr. 30, 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	2.9	316	18	71	104	3.0	641	1,680	421	1,140	78	122
2	2.4	130	17	56	1,190	3.5	481	657	274	841	66	83
3	2.2	80	17	47	413	3.5	1,960	481	246	801	63	65
4	3.4	63	13	42	109	3.5	1,760	316	169	381	58	57
5	4.5	47	8.8	30	59	3.4	3,300	401	118	204	51	37
6	3.8	40	8.8	30	45	3.0	2,620	1,940	106	246	47	31
7	2.8	1,570	10	30	33	2.9	1,100	1,000	102	152	47	29
8	1.7	4,390	11	30	26	3.0	326	1,240	292	78	47	26
9	1.6	569	8.8	21	21	3.2	326	429	721	66	47	27
10	9.2	449	18	18	21	3.2	441	228	1,300	56	1,380	26
11	10	409	10	16	13	3.2	721	369	1,100	51	204	19
12	1,630	281	8.0	11	14	2.9	1,240	521	901	44	102	16
13	1,230	130	6.4	12	11	2.8	721	256	821	42	66	13
14	2,090	58	7.2	15	11	2.9	326	1,260	362	38	56	10
15	1,230	40	6.8	18	9.6	5.8	152	961	204	36	38	11
16	593	40	6.4	19	7.6	3.8	97	701	299	42	30	15
17	162	32	8.0	16	6.8	4.5	381	344	1,600	44	34	13
18	82	33	6.3	12	6.8	4.2	176	761	781	32	34	12
19	54	24	8.0	12	6.4	3.8	53	3,700	344	30	1,110	14
20	39	18	1,390	12	6.0	4.8	47	1,640	601	3,900	3,500	18
21	26	18	765	16	5.8	12	44	1,300	1,300	8,620	7,330	18
22	2,670	18	725	3,040	4.8	14	42	1,360	1,740	5,340	2,680	109
23	4,680	18	4,110	1,280	4.0	7.6	42	529	1,700	4,590	2,480	113
24	4,370	15	3,840	445	5.0	11	38	309	1,100	5,060	1,060	250
25	1,350	15	1,790	597	5.5	7,180	30	5,000	1,020	5,810	401	453
26	2,540	18	1,320	183	4.8	5,370	26	5,870	1,180	1,120	461	214
27	7,830	21	425	1,240	4.8	2,930	1,180	11,500	1,120	381	369	99
28	6,340	24	180	817	3.2	2,050	2,440	11,500	881	222	169	69
29	4,970	26	99	330	.....	1,200	2,860	9,650	621	152	256	54
30	3,620	28	147	190	.....	441	2,530	4,850	901	113	721	49
31	3,220	.....	99	149	.....	1,360	.....	741	.....	93	274	.....
1919-20.												
1	33	573	20	11	50	15	6.0	.....	.....	.....	.....	.....
2	25	385	19	9.0	47	15	5.5	.....	.....	.....	.....	.....
3	23	405	19	9.0	53	12	5.0	.....	.....	.....	.....	.....
4	23	190	24	8.0	50	13	5.3	.....	.....	.....	.....	.....
5	75	104	22	9.0	44	12	4.5	.....	.....	.....	.....	.....
6	75	149	19	11	40	12	4.5	.....	.....	.....	.....	.....
7	69	52	20	11	32	12	4.0	.....	.....	.....	.....	.....
8	553	67	19	10	32	13	4.0	.....	.....	.....	.....	.....
9	1,710	312	16	5.5	32	11	4.0	.....	.....	.....	.....	.....
10	2,270	985	13	9.2	32	10	4.0	.....	.....	.....	.....	.....
11	453	425	13	9.2	36	11	4.0	.....	.....	.....	.....	.....
12	197	267	13	13	33	12	4.0	.....	.....	.....	.....	.....
13	133	116	13	13	32	12	3.8	.....	.....	.....	.....	.....
14	90	72	13	18	32	12	3.5	.....	.....	.....	.....	.....
15	66	62	13	22	32	11	3.5	.....	.....	.....	.....	.....
16	80	59	14	40	32	8.8	3.4	.....	.....	.....	.....	.....
17	401	44	12	43	36	12	3.0	.....	.....	.....	.....	.....
18	281	34	11	37	28	10	2.9	.....	.....	.....	.....	.....
19	106	34	9.0	41	24	11	2.8	.....	.....	.....	.....	.....
20	97	38	7.0	37	24	12	2.6	.....	.....	.....	.....	.....
21	1,410	33	7.0	37	19	12	2.4	.....	.....	.....	.....	.....
22	1,190	16	8.0	48	23	12	2.0	.....	.....	.....	.....	.....
23	292	14	11	65	24	12	1.8	.....	.....	.....	.....	.....
24	246	12	12	340	23	11	1.4	.....	.....	.....	.....	.....
25	222	6.0	11	295	44	12	1.4	.....	.....	.....	.....	.....
26	176	16	9.0	149	21	8.4	1.8	.....	.....	.....	.....	.....
27	125	19	9.0	80	13	8.8	253	.....	.....	.....	.....	.....
28	63	23	9.0	65	12	6.0	581	.....	.....	.....	.....	.....
29	144	26	9.0	65	16	6.0	228	.....	.....	.....	.....	.....
30	194	19	13	60	.....	6.0	88	.....	.....	.....	.....	.....
31	73	.....	18	60	.....	6.0	.....	.....	.....	.....	.....	.....

NOTE.—Discharge, May 27 and 28, 1919, determined from extension of rating curve.

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Daily discharge, in second-feet, of Little River at Cameron, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	401	1,410	593	3,160	4,060	1,540	5,000	7,230	1,380	11,100	1,520	1,020
2	150	902	636	1,910	4,220	1,460	4,330	6,920	1,240	9,740	1,320	838
3	87	731	590	1,340	7,980	1,420	3,830	4,740	1,380	6,090	1,200	787
4	65	546	457	1,140	6,980	1,380	5,110	2,950	1,930	4,100	1,100	737
5	51	339	398	1,020	4,700	1,360	4,310	1,560	1,580	3,270	1,020	689
6	45	223	351	909	4,010	1,400	3,290	1,480	1,180	2,910	927	643
7	40	167	323	804	3,830	1,640	3,000	3,780	1,020	2,840	891	581
8	34	370	292	753	3,450	1,400	3,360	4,900	950	4,720	838	565
9	32	5,650	267	737	3,450	1,420	2,860	5,610	909	9,130	821	537
10	27	8,730	250	674	3,520	1,700	2,120	3,380	1,080	7,180	804	525
11	32	7,880	233	643	2,930	1,540	2,080	2,680	2,930	3,380	1,140	506
12	28	6,580	226	612	2,290	1,320	2,010	3,380	4,310	2,310	1,040	491
13	26	7,820	1,770	565	2,060	1,220	1,700	5,490	2,370	2,030	821	472
14	24	9,380	3,300	534	1,870	1,160	1,540	4,280	1,400	1,800	737	444
15	218	10,300	3,770	550	1,720	1,120	1,440	2,500	1,300	1,660	721	447
16	120	9,440	2,300	3,540	1,560	1,120	1,320	2,290	3,580	1,560	674	2,060
17	298	7,300	1,470	3,540	1,930	1,260	1,220	1,740	7,640	1,620	643	1,800
18	156	3,870	636	2,220	4,720	1,870	1,140	2,950	12,800	1,460	643	1,360
19	84	1,820	509	2,100	3,760	1,560	1,080	3,940	12,100	1,930	674	770
20	67	1,140	920	2,440	6,020	1,180	1,040	3,600	4,740	1,740	927	633
21	56	747	2,280	2,640	6,210	1,040	984	5,950	7,410	2,060	1,780	731
22	117	605	3,190	6,500	2,860	984	927	6,140	7,080	3,700	2,910	3,060
23	78	528	3,630	13,100	2,350	927	891	4,970	5,370	8,030	3,270	7,750
24	2,110	466	10,300	13,300	2,060	891	855	6,140	4,610	8,860	5,440	12,200
25	3,720	419	12,700	10,400	1,910	1,740	821	7,820	5,470	5,350	3,810	12,100
26	2,720	432	13,600	7,030	1,820	9,240	769	5,590	10,000	4,120	3,040	7,510
27	2,760	463	9,100	5,680	1,700	9,240	721	6,210	12,000	3,130	4,150	3,060
28	3,210	556	5,040	5,870	1,620	5,990	721	5,470	13,500	2,480	3,060	2,080
29	2,830	484	4,290	5,920	.....	4,470	737	2,700	13,600	2,420	2,460	2,080
30	1,840	534	4,220	5,090	.....	4,240	3,180	1,840	11,600	2,180	1,780	1,700
31	1,860	.....	3,930	4,260	.....	4,540	.....	1,560	.....	1,780	1,340	.....
1919-20.												
1	1,400	6,070	6,800	2,220	4,740	2,350	2,140	965	1,480	1,970	627	1,720
2	1,200	5,110	6,600	2,180	4,560	2,310	2,060	927	1,400	2,010	596	1,560
3	1,160	4,970	5,630	2,100	4,380	2,220	1,760	891	1,240	1,640	565	2,010
4	1,120	3,920	5,870	2,060	4,240	2,660	1,640	891	4,060	1,240	658	2,180
5	1,080	3,600	5,540	2,400	4,010	2,750	1,520	855	4,380	1,440	658	1,600
6	1,080	3,060	4,790	6,400	3,920	2,220	1,440	855	2,440	3,380	721	1,240
7	2,620	2,880	4,280	7,260	3,880	2,060	1,400	821	3,780	1,600	2,480	1,280
8	3,470	2,880	4,150	8,140	3,740	1,970	1,400	1,520	2,480	1,000	10,800	5,830
9	1,400	5,020	3,880	8,090	3,650	1,930	1,400	3,290	1,760	927	13,900	8,890
10	1,440	10,000	4,840	5,830	3,560	1,930	1,360	3,020	1,560	787	13,000	10,000
11	4,280	12,300	4,240	4,650	3,470	1,970	1,360	3,060	1,240	787	7,200	8,780
12	12,700	12,300	3,830	9,160	3,600	1,970	1,280	1,800	1,160	1,760	2,570	6,310
13	14,500	13,000	3,470	13,400	4,280	1,890	1,240	1,440	1,080	2,010	2,260	4,150
14	13,800	12,500	3,240	14,000	4,790	1,840	1,200	2,180	1,000	1,480	2,800	2,980
15	10,700	10,700	3,110	13,100	4,330	1,720	1,160	5,210	965	1,520	2,010	3,160
16	10,600	7,720	2,880	10,800	3,740	1,720	1,160	11,700	927	1,440	1,970	3,600
17	11,800	4,930	2,800	8,350	3,600	1,720	1,120	14,300	927	965	2,750	3,700
18	12,100	4,330	2,800	7,620	3,470	1,720	1,120	13,500	1,200	787	3,110	3,020
19	10,600	4,010	3,600	6,700	3,380	1,680	1,120	7,770	2,100	753	3,110	1,840
20	6,650	3,740	5,400	5,680	3,290	1,640	1,120	4,650	3,020	721	2,660	1,520
21	5,540	3,560	3,560	5,350	3,060	1,600	1,080	4,560	4,560	658	2,480	1,280
22	7,620	3,380	3,290	5,110	2,980	1,600	1,000	4,010	2,570	658	2,480	1,120
23	7,880	3,240	3,020	9,770	2,880	1,560	1,000	2,700	1,890	658	1,840	1,080
24	10,300	3,160	2,840	14,400	2,800	1,520	965	2,660	2,140	658	1,680	927
25	10,400	3,020	2,750	14,400	2,700	1,600	965	3,060	2,140	658	1,360	891
26	9,990	3,060	2,660	11,400	2,570	2,220	1,000	2,800	1,890	565	2,060	855
27	7,460	3,340	2,570	6,450	2,480	2,880	1,000	2,140	1,640	534	2,570	787
28	6,160	3,520	2,480	5,870	2,400	2,480	1,000	1,890	1,600	503	1,840	753
29	6,210	3,470	2,400	5,680	2,400	2,010	965	1,680	1,800	472	1,680	753
30	5,540	5,730	2,350	5,160	.....	1,890	965	1,560	1,760	658	1,600	787
31	5,780	.....	2,260	4,970	.....	2,060	.....	1,400	.....	596	1,520	.....

NOTE.—Indirect method for shifting control used Oct. 1 to Nov. 8 and Nov. 19 to Dec. 23, 1918; Feb. 1 to May 22 and Aug. 12 to Sept. 30, 1920. See "Accuracy."

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Monthly discharge of Little River at Cameron, Tex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	3,720	24	751	46,200
November	10,300	167	2,990	178,000
December	13,600	226	2,950	181,000
January	13,300	534	3,520	216,000
February	7,980	1,560	3,410	189,000
March	9,240	891	2,300	141,000
April	5,110	721	2,080	124,000
May	7,820	1,560	4,180	257,000
June	13,600	909	5,220	311,000
July	11,100	1,460	4,020	247,000
August	5,440	643	1,660	102,000
September	12,200	444	2,270	135,000
The year	13,600	24	2,940	2,130,000
1919-20.				
October	14,500	1,080	6,660	410,000
November	13,000	2,880	5,620	334,000
December	6,800	2,260	3,800	234,000
January	14,400	2,060	7,380	454,000
February	4,790	2,400	3,550	204,000
March	2,880	1,520	1,990	122,000
April	2,140	965	1,260	75,000
May	14,300	821	3,490	215,000
June	4,560	927	2,010	120,000
July	3,380	472	1,120	68,900
August	13,900	565	3,080	189,000
September	10,000	753	2,820	168,000
The year	14,500	472	3,570	2,590,000

NOTE.—The above table shows the discharge in main channel only. See "Accuracy" in station description.

COLORADO RIVER BASIN.

COLORADO RIVER NEAR BRONTE, TEX.

LOCATION.—At wagon bridge 400 feet below Kansas City, Mexico & Orient Railroad bridge, 1½ miles above mouth of Kickapoo Creek and below mouth of Live Oak Creek, and 2½ miles south of Bronte, Coke County.

DRAINAGE AREA.—5,550 square miles (measured on standard topographic maps; post-route map; and topographic map of Texas, compiled in 1899 by Robert T. Hill, of the United States Geological Survey; scale, 1 inch=25 miles).

RECORDS AVAILABLE.—September 19, 1915, to September 30, 1920.

GAGE.—Chain gage attached to downstream side of bridge near left bank. Read by J. E. Gay, Mrs. D. S. McAuley, Dick Walden, Mrs. W. O. Kissee, and Miss Irene Walden. Vertical staff attached to left bent of railroad bridge 400 feet above present site and referred to same datum was used from September 19 to October 29, 1915.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of a clay hardpan with gravel; shifts. Channel straight about 500 feet above and below station. Right bank wooded, sloping, and subject to overflow at extreme stages; left bank high, clean, and not likely to overflow. Control probably at shoal 300 feet below gage; shifts.

EXTREMES OF STAGE.—Maximum stage recorded during year ending September 30, 1919, 16.6 feet at 5.30 p. m. July 20; no flow during several periods in October and November.

Maximum stage recorded during year ending September 30, 1920, 17.1 feet at 8.30 a. m. October 6; minimum stage, 2.94 feet May 4 and 5.

1915-1920: Maximum stage recorded in 1920 (see above); no flow during periods throughout the record.

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DIVERSIONS.—During low stages a large part of the flow is diverted a few miles above the station for irrigation. Records of the Board of Water Engineers for State of Texas show that about 6,900 acres have been declared irrigated above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Rating curve fairly well defined below 12,000 second-feet. Gage read to hundredths twice daily. Daily discharge determined by applying mean daily gage height to rating table or by indirect method for shifting control as noted in footnote to daily-discharge table. Records above 12,000 second-feet determined from extension of rating curve and subject to error. Records below 12,000 second-feet good.

Discharge measurements of Colorado River at Ballinger, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 5	Kinnison and Gowans..	0.31	0	Dec. 15	D. A. Dudley.....	0.68	44.6
1919.				1920.			
Jan. 10	Ellsworth and Congdon	.70	9.0	Jan. 17	.....do.....	.76	57.1
May 14	J. E. Powers.....	1.15	136	Mar. 11	.....do.....	.54	23.8
June 17	C. E. Ellsworth.....	7.96	6,940	Apr. 6	.....do.....	.42	6.94
17	.....do.....	7.10	6,060	May 26	.....do.....	.90	118
18	.....do.....	4.67	2,740	June 30	.....do.....	.78	77.1
18	.....do.....	3.89	1,910	Aug. 24	.....do.....	14.78	[a] 16,000
19	.....do.....	3.09	1,300	Sept. 7	.....do.....	10.76	[b] 11,500
Aug. 6	Dudley and Twichell...	.84	83.0	7	.....do.....	9.72	[b] 10,400
Nov. 13	D. A. Dudley.....	.93	105				

[a] Probably in error. Not used to define rating curve.
[b] Surface velocities observed and coefficient of 1.05 used to reduce to mean velocity.

Daily discharge, in second-feet, of Colorado River at Ballinger, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1...	0.5	225	13	12	13	2.3	1,680	367	1,160	518	131	250
2...	0	176	10	12	12	2.3	925	257	2,030	197	123	206
3...	0	130	9.2	15	10	2.3	3,700	163	903	133	114	160
4...	0	104	10	15	9.8	2.3	1,930	141	410	136	100	138
5...	0	86	9.2	15	8.0	2.3	985	10,600	215	143	89	125
6...	0	68	9.2	11	7.4	1.9	544	339	136	102	78	116
7...	0	4,980	8.6	10	6.2	1.9	410	479	219	102	71	106
8...	0	1,660	9.2	10	5.6	1.9	239	432	212	84	69	97
9...	15	713	8.6	10	5.6	10	188	296	5,760	75	66	89
10...	5,910	168	8.0	9.2	5.6	53	2,100	200	15,200	1,070	64	89
11...	4,600	92	8.0	9.2	5.6	114	2,780	473	14,900	1,080	63	76
12...	888	61	8.0	9.2	5.6	71	1,060	537	6,540	531	59	71
13...	212	46	10	9.2	4.4	46	648	229	1,180	300	53	68
14...	164	37	9.8	9.2	4.1	26	344	131	544	182	47	63
15...	117	39	8.6	10	4.1	18	209	194	280	112	40	93
16...	68	37	8.0	12	4.1	13	166	399	11,400	87	40	4,420
17...	33	27	8.0	15	4.1	12	129	160	9,070	76	46	1,770
18...	19	21	8.0	15	4.1	9.8	123	125	2,550	66	43	3,250
19...	17	16	9.8	16	4.4	8.0	112	200	2,070	197	41	746
20...	12	13	98	11	4.7	8.0	104	143	2,950	13,400	41	697
21...	1,830	12	101	10	4.7	6.8	91	106	2,980	23,400	41	5,770
22...	12,700	13	41	17	4.7	7.4	87	82	4,550	20,000	51	7,380
23...	8,170	10	1,130	71	4.7	8.6	82	70	6,080	2,110	798	2,540
24...	3,150	10	229	31	4.7	9,680	80	5,530	1,540	1,120	305	843
25...	1,620	11	63	17	4.1	12,100	75	456	1,020	683	158	410
26...	2,400	18	31	11	3.5	8,700	76	148	479	432	13,900	273
27...	14,100	22	19	10	2.9	1,640	131	106	1,160	296	9,580	219
28...	14,900	22	18	10	2.3	662	138	80	1,140	229	2,470	158
29...	1,750	19	12	12	.....	399	108	63	620	206	970	136
30...	734	17	11	12	.....	334	100	57	1,040	177	505	121
31...	430	.....	12	12	.....	265	.....	53	.....	150	313	.....

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Daily discharge, in second-feet, of Colorado River at Ballinger, Tex., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1...	107	1,260	85	33	44	24	12	0	63	49	1.9	1,060
2...	243	910	77	32	47	24	12	0	85	42	3.2	550
3...	158	518	71	30	45	24	13	0	107	30	79	394
4...	132	321	69	33	42	24	11	0	98	29	45	261
5...	100	236	67	42	40	24	7.6	0	177	26	19	473
6...	5,840	197	67	47	40	24	7.6	0	348	26	49	5,280
7...	18,300	179	61	47	42	24	9.7	1,720	226	13	254	12,200
8...	4,200	197	54	47	44	24	12	485	152	9.7	51	3,580
9...	1,560	148	54	44	42	24	14	331	121	7.6	20	2,000
10...	1,220	142	51	44	54	22	13	3,460	85	11	9.7	872
11...	985	140	47	63	51	22	14	3,460	73	11	4.2	518
12...	1,100	138	45	67	49	22	9.7	4,200	60	7.6	948	321
13...	1,100	107	49	65	47	20	7.6	2,090	58	5.0	948	239
14...	910	103	49	54	44	19	5.5	725	52	6.6	426	177
15...	518	98	45	54	40	19	6.6	426	47	3.2	485	185
16...	300	98	45	52	40	19	8.6	6,260	52	0	456	250
17...	276	98	47	51	40	19	6.6	13,200	317	0	7,770	182
18...	485	92	49	54	40	19	5.5	2,090	166	0	12,100	130
19...	1,140	92	49	52	37	17	5.0	910	125	0	12,500	135
20...	485	87	49	49	35	19	4.5	485	138	0	14,500	121
21...	321	83	45	52	33	16	4.1	292	985	0	9,180	112
22...	2,590	79	49	58	33	16	3.7	212	485	0	1,640	103
23...	377	79	47	61	33	16	3.2	168	236	37	8,860	94
24...	209	75	45	61	33	16	1.0	160	304	7.6	16,900	87
25...	152	75	49	60	32	16	.4	140	226	5.5	5,140	77
26...	125	75	45	56	30	16	.9	114	239	3.7	1,820	73
27...	116	75	42	52	27	16	.3	100	194	.6	1,560	71
28...	109	78	38	51	27	15	.2	89	135	0	2,390	71
29...	112	82	38	49	27	12	0	85	94	0	3,460	69
30...	12,200	85	37	47	.....	12	0	77	71	1.9	2,000	61
31...	5,420	.....	35	47	.....	13	.....	71	.....	11	1,100	.....

NOTE.—Indirect method for shifting control used Oct. 1, 1918, to Mar. 24, 1919, May 6–23, July 23 to Aug. 25, Aug. 28 to Dec. 31, 1919; May 17 to July 14 and Aug. 18 to Sept. 30, 1920. Discharge on following days determined from extension of rating curve and subject to considerable error: Oct. 22, 23, 27, 28, 1918; Mar. 24–26, May 5, June 10, 11, 16, 17, July 20–22, Aug. 25 and 26, 1919.

Monthly discharge of Colorado River at Ballinger, Tex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	14,900	0	2,380	146,000
November	4,980	10	295	17,600
December	1,130	8.0	62.5	3,840
January	71	9.2	14.5	892
February	13	2.3	5.71	317
March	12,100	1.9	1,100	67,600
April	3,700	75	645	38,400
May	10,600	53	730	44,900
June	15,200	136	3,280	195,000
July	23,400	66	2,170	133,000
August	13,900	40	983	60,400
September	7,380	63	1,020	60,700
The year	23,400	0	1,060	769,000
1919–20.				
October	18,300	100	1,970	121,000
November	1,260	75	198	11,800
December	85	35	51.6	3,170
January	67	30	50.1	3,080
February	54	27	39.2	2,250
March	24	12	19.3	1,190
April	14	0	6.64	395
May	13,200	0	1,330	81,800
June	985	47	184	10,900
July	49	0	11.1	682
August	16,900	1.9	3,380	208,000
September	12,200	61	992	59,000
The year	18,300	0	693	503,000

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Discharge measurements of Colorado River near Chadwick, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Ft.*	*Sec.-ft.*	1919.		*Ft.*	*Sec.-ft.*
Oct. 13	Kinnison and Gowans	17.20	[a] 17,900	May 22	J. E. Powers	4.00	1,320
Nov. 9	E. P. Congdon	35.6	[b] 58,000	Aug. 9	Dudley and Twichell	2.40	375
10	do	41.3	[b] 76,900	Nov. 3	D. A. Dudley	6.00	2,880
11	do	31.5	[b] 45,200				
11	do	27.1	[b] 34,400	1920.			
				Mar. 3	do	2.82	615
1919.				Apr. 26	do	1.78	296
Jan. 13	Ellsworth and Congdon	1.58	219	June 3	do	2.82	708
22	E. P. Congdon	12.20	[a] 10,600	July 13	do	J.66	351
23	do	17.79	[a] 19,600				

[a] Surface velocity observed and coefficient of 0.90 used to reduce to mean velocity.
[b] Surface velocity observed and coefficient of 1.00 used to reduce to mean velocity.

Daily discharge, in second-feet, of Colorado River near Chadwick, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	45	1,250	277	225	633	123	3,230	1,660	500	4,660	633	1,000
2	45	900	277	175	705	123	2,000	900	395	3,810	395	615
3	31	615	225	155	9,570	123	1,680	615	2,440	2,330	.....	465
4	29	458	225	135	2,000	121	1,250	430	1,460	1,530	.....	335
5	33	395	200	135	1,150	121	7,220	1,120	1,000	1,250	.....	615
6	31	335	175	95	928	123	3,610	3,140	800	820	.....	705
7	31	1,740	175	79	705	125	2,330	8,260	705	870	.....	535
8	29	23,000	175	75	615	125	1,840	3,220	551	615	.....	335
9	29	56,100	175	75	543	200	950	1,620	1,840	500	430	311
10	335	74,100	175	66	465	200	1,000	1,000	10,100	6,580	335	277
11	14,200	37,500	155	60	423	195	4,650	1,120	20,500	3,250	320	220
12	18,900	2,440	155	95	305	190	4,010	3,610	27,900	1,840	283	188
13	17,300	1,250	200	95	288	190	2,960	2,580	29,300	820	225	175
14	9,690	900	200	175	129	185	2,690	1,540	5,090	705	200	175
15	2,080	1,840	155	155	127	185	2,000	1,460	2,160	660	200	705
16	900	1,250	115	250	127	225	705	1,390	1,620	615	200	960
17	669	335	75	395	131	230	615	9,850	2,000	705	200	8,000
18	430	277	75	750	133	225	465	2,240	13,200	615	195	3,320
19	283	277	1,000	705	133	220	395	5,450	12,700	535	335	3,810
20	185	225	3,230	638	129	225	365	3,160	4,650	4,870	395	4,210
21	220	225	1,180	750	127	220	335	2,460	12,600	36,600	9,170	10,300
22	2,760	200	900	9,850	127	220	311	1,250	7,480	27,800	12,700	16,400
23	15,700	200	18,000	19,100	131	220	291	1,120	10,600	22,100	8,460	33,200
24	23,000	225	9,990	16,100	131	4,320	277	900	13,400	20,900	4,210	20,200
25	15,700	200	1,840	3,050	129	12,000	277	.....	10,100	9,170	3,810	15,700
26	3,810	305	1,250	1,530	127	19,900	230	.....	16,100	6,960	6,530	13,500
27	2,330	705	1,120	2,580	127	22,800	205	.....	13,500	4,210	9,850	9,170
28	2,000	615	850	6,340	125	12,400	175	5,540	10,400	3,250	13,300	7,350
29	14,200	365	705	2,000	.....	2,870	500	1,700	9,170	1,870	9,300	6,000
30	9,850	335	585	1,120	.....	3,060	2,420	840	8,260	810	3,050	5,310
31	3,060	.....	465	705	.....	3,140	.....	633	.....	705	2,190	.....

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Daily discharge, in second-feet, of Colorado River near Chadwick, Tex., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1				482	800	522	430	291	412	396	274	2,960
2				448	1,180	568	412	277	412	291	264	2,870
3		2,870		448	1,680	615	412	277	638	285	258	2,780
4				390	1,250		365	274	535	285	258	2,420
5				412	800		365	272	575	283	258	3,000
6				350	800		350	277	465	285	261	
7			900	518	705		350	2,960	335	285	728	
8			705	589	682		350	14,200	335	283	728	24,700
9			705	660	660		335	6,000	320	280	682	23,600
10			2,510	950	660		320	12,700	305	448	595	8,520
11			2,000	4,650	638		320	12,100	311	392	448	7,610
12			1,180	7,220	638		320	14,400	305	365	359	3,710
13			705	3,710	638		320	16,700	305	332	326	2,160
14			705	2,510	615		320	6,700	299	326	470	1,680
15			682	1,390	412		320	7,740	294	314	615	1,320
16			682	1,250	350		320	8,780	294	299	1,390	1,060
17			682	1,120	350		305	6,340	294	272	4,010	800
18			901	705	350		305	5,660	294	273	8,130	775
19			1,120	800	335		305	4,870	412	274	9,370	638
20			800	850	350		305	3,080	606	272	10,600	615
21			705	1,000	335		305	1,460	800	269	8,520	595
22			705	1,000	520		305	1,360	500	269	8,390	595
23			638	900	705		305	1,250	775	266	6,120	555
24			638	900	682		305	1,120	2,960	266	5,660	445
25			638	850	682		291	1,120	2,280	274	5,200	335
26			638	800	575		291	1,000	1,600	272	4,870	335
27			638	705	482	800	291	1,000	1,460	266	4,210	335
28			595	705	430	638	291	900	1,180	266	4,110	320
29			595	682	476	575	291	535	850	264	3,910	320
30			595	682		395	291	500	500	311	3,140	302
31			595	660		335		465		283	3,140	

NOTE.—Discharge interpolated Oct. 14, Dec. 30, 1918, Feb. 6, Mar. 31, May 1, 13, 15, July 15, Aug. 23, Sept. 21, Dec. 18, and 26, 1919; Jan. 8, Feb. 22, 29, Mar. 1, 2, Apr. 11, 23, May 15, 22, 30, June 20, 25, July 1, 18, Aug. 4, 14, 19, 24, Sept. 2, 16, and 24, 1920.

Discharge estimated: Dec. 18, 1918; Mar. 23, Apr. 10, May 25–27 (10,000 second-feet), Aug. 3–8 (350 second-feet), Sept. 17, 1919; and Sept. 5–7, 1920. No record for periods not recorded. Discharge Apr. 1 to June 3, 1920, possibly slightly in error, owing to change in location of gage. See "Accuracy" in station description.

Monthly discharge of Colorado River near Chadwick, Tex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	23,000	29	5,090	313,000
November	74,100	200	6,960	414,000
December	18,000	75	1,430	87,900
January	19,100	60	2,180	134,000
February	9,570	125	724	40,200
March	22,800	121	2,730	168,000
April	7,220	175	1,630	97,000
May	.....	430	3,190	196,000
June	29,330	395	8,350	497,000
July	36,600	500	5,5 0	341,000
August	13,300	195	2,870	176,000
September	33,200	175	5,4 0	325,000
The year	74,100	29	3,850	2,790,000
1919–20.				
December 7–31	2,510	595	850	42,100
January	7,220	350	1,240	76,200
February	1,680	335	648	37,300
April	430	291	326	19,400
May	16,700	272	4,340	267,000
June	2,960	294	685	40,800
July	448	264	298	18,300
August	10,600	258	3,140	193,000
September	24,700	302	3,380	201,000

NOTE.—See footnote to table of daily discharge.

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COLORADO RIVER AT MARBLE FALLS, TEX.

LOCATION.—At steel highway bridge one-fourth mile south of Marble Falls, Burnet County, 10 miles below mouth of Sandy Creek, 16 miles below mouth of Llano River, and 23 miles above mouth of Pedernales River.

DRAINAGE AREA.—32,200 square miles (measured on topographic and post-route maps).

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1920. Miscellaneous discharge measurements were made in 1902. Records of stage have been obtained by the United States Weather Bureau since January 1, 1908.

GAGE.—United States Weather Bureau weight and tape gage on upstream side of bridge; read by M. M. Berry and M. M. Galloway.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of solid rock. Banks composed of rock, gravel, and clay; high, wooded, and not subject to overflow. Rapids just below gage serve as permanent control for low and medium stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 18.7 feet at 7.30 a. m. September 24 (discharge, 85,000 second-feet, determined from extension of rating curve); minimum stage, 0.70 foot, October 9 and 10 (discharge, 68 second-feet).

Maximum stage recorded during year ending September 30, 1920, 14.2 feet at 7.30 a. m., October 11 (discharge, 52,400 second-feet); minimum stage, 1.50 feet at 7.30 a. m., July 21 (discharge, 236 second-feet).

1900–1920: Maximum stage recorded, 23.9 feet, April 7, 1900 (discharge, not determined); no flow August 7, 8, 11–25, 1918, caused by storing water above gage.

ICE.—None reported during year.

DIVERSIONS.—Several large projects have been proposed in the drainage basin above station, but none have been developed. Numerous small diversions for irrigation and municipal uses are made above the station. Total amount diverted not known. Records of the Board of Water Engineers for the State of Texas show that approximately 36,000 acres have been declared irrigated by diversions above station. Little water is diverted between Marble Falls and Austin.

REGULATION.—None except possibly during extremely low stages.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to half-tenths twice daily. Mean of two readings daily during low stages may not be true mean owing to operation of water-power plant just above. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Colorado River at Marble Falls, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Ft.*	*Sec.-ft.*	1920.		*Ft.*	*Sec.-ft.*
Oct. 2	Kinnison and Gowans..	1.10	141	Feb. 14	T. Twichell.....	3.82	2,780
				Apr. 28	D. A. Dudley.....	2.28	580
1919.				28	.....do.....	2.28	589
Jan. 6	Ellsworth and Congdon	2.74	949	28	.....do.....	2.28	591
May 23	J. E. Powers.....	3.91	2,790				
Nov. 1	D. A. Dudley.....	4.29	[a] 3,610				

[a] Surface velocities observed and coefficient of 0.85 used to reduce to mean velocity.

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Daily discharge, in second-feet, of Colorado River at Marble Falls, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19												
1	187	3,450	1,080	1,750	2,600	1,020	7,230	2,600	1,530	12,200	1,500	3,160
2	137	2,640	805	2,140	2,410	779	7,750	2,640	1,600	10,700	1,260	2,410
3	114	2,190	688	2,000	2,740	779	3,050	1,880	1,390	6,400	1,140	1,880
4	100	1,300	632	1,460	7,920	868	2,640	1,460	1,080	4,240	1,000	1,570
5	97	1,000	618	1,140	5,020	1,080	3,450	1,120	3,010	3,450	946	1,390
6	83	1,000	618	1,000	3,570	868	9,700	1,910	2,360	2,700	917	1,260
7	83	3,640	618	917	2,500	779	5,020	4,460	1,800	15,600	822	1,140
8	80	40,200	618	818	1,910	917	2,900	15,600	1,360	5,620	822	1,000
9	68	46,700	618	822	1,530	1,260	2,320	6,080	1,830	3,010	762	968
10	68	48,500	565	762	1,300	1,200	2,090	3,570	7,080	2,360	1,680	917
11	14,900	71,500	481	740	1,360	897	1,880	6,400	21,400	10,800	897	848
12	21,900	24,500	438	688	1,360	822	1,680	26,100	29,800	4,600	848	779
13	22,400	5,080	3,330	688	1,300	762	1,200	11,400	31,000	2,700	725	725
14	18,600	3,220	3,810	703	1,300	1,280	3,680	9,340	31,000	3,120	688	779
15	7,920	2,840	1,030	917	1,260	703	2,600	9,880	10,800	2,410	618	3,730
16	4,240	4,680	688	1,460	1,200	848	1,800	15,600	4,320	2,090	565	6,140
17	3,120	2,640	688	1,750	1,800	822	1,430	11,600	3,930	1,910	504	8,630
18	2,020	2,140	805	3,810	3,450	725	1,180	9,080	9,880	1,910	449	6,460
19	1,300	1,690	1,400	2,950	2,450	667	1,060	6,240	16,700	1,500	1,360	7,580
20	1,120	1,300	1,910	2,600	2,000	618	822	6,560	18,700	1,240	1,570	5,170
21	868	1,180	2,270	6,960	1,830	667	740	10,200	8,520	14,100	10,900	20,700
22	1,570	1,280	7,640	17,800	1,680	632	703	5,470	16,000	41,800	16,000	26,600
23	7,750	926	34,800	22,100	1,530	598	667	1,260	14,900	29,100	11,800	42,600
24	20,400	747	22,900	22,000	1,300	1,140	618	1,910	18,400	27,400	10,100	84,200
25	23,400	725	14,400	17,100	1,260	26,400	565	1,830	18,300	22,500	6,460	51,400
26	15,400	946	8,200	12,000	762	18,600	585	18,000	29,800	8,450	9,230	17,400
27	8,000	1,240	5,470	7,400	1,020	26,200	476	14,700	26,200	3,930	5,170	13,100
28	5,620	2,190	3,330	5,620	848	24,800	438	6,620	22,600	2,800	8,000	6,720
29	11,600	2,500	2,640	10,700	.....	16,000	1,960	6,240	19,400	2,360	16,100	5,020
30	12,800	2,270	2,270	4,460	.....	4,880	3,610	3,500	14,500	1,910	10,100	4,190
31	9,880	.....	2,140	3,220	.....	5,380	.....	2,050	.....	1,750	5,780	.....
1919-20												
1	3,450	3,450	5,930	1,570	2,600	1,500	1,060	565	946	848	413	5,020
2	3,120	10,400	5,620	1,500	2,500	1,430	1,060	552	946	848	413	3,930
3	2,800	7,920	3,930	1,430	2,410	1,430	1,000	552	1,880	762	492	3,220
4	2,600	5,020	3,450	1,570	2,410	1,360	946	1,240	2,050	848	618	2,600
5	2,600	3,930	3,220	1,880	2,410	1,300	946	1,300	1,800	848	438	3,120
6	2,800	3,330	3,010	2,800	2,410	1,300	848	848	1,360	688	618	2,800
7	3,450	3,010	3,010	5,020	2,230	1,180	762	618	1,240	552	9,700	2,800
8	21,400	4,470	2,900	4,190	2,220	1,300	762	6,890	1,060	492	1,570	22,900
9	27,200	24,000	2,800	3,450	2,230	1,300	762	20,900	762	465	1,430	27,700
10	35,100	19,000	2,500	2,800	2,230	1,430	688	17,100	725	492	1,000	27,700
11	46,000	8,630	2,410	3,450	2,230	1,430	762	5,930	688	762	762	16,700
12	13,600	6,890	2,230	18,000	2,410	1,300	725	19,000	1,060	762	688	15,300
13	7,920	5,620	2,050	16,200	2,600	1,300	762	26,100	897	618	946	6,240
14	5,620	3,930	2,050	9,700	2,500	1,180	688	14,900	762	492	1,570	2,800
15	6,240	3,450	1,960	7,580	2,600	1,180	688	15,800	688	465	2,410	2,050
16	12,800	3,220	1,880	5,620	2,600	1,180	688	18,000	688	492	2,230	1,720
17	19,000	3,220	1,880	4,740	2,230	1,180	688	13,200	653	438	2,410	1,570
18	20,900	3,010	1,880	4,190	2,230	1,180	653	7,580	585	388	4,190	1,430
19	11,200	2,800	2,230	3,680	2,320	1,180	688	12,800	762	344	4,460	1,060
20	6,890	2,600	2,230	3,450	2,140	1,180	618	11,600	1,360	304	10,800	946
21	4,460	2,600	2,140	3,450	2,050	1,060	618	4,460	848	268	20,900	946
22	6,560	2,320	2,230	3,220	1,960	1,060	618	3,450	946	304	13,600	946
23	16,200	2,410	2,050	3,930	1,880	1,180	618	2,230	1,060	344	11,200	848
24	20,900	2,410	2,050	7,920	1,880	1,180	618	1,880	848	388	8,280	848
25	21,900	2,500	1,880	4,460	1,720	1,430	618	1,570	2,050	344	3,680	762
26	8,630	2,600	3,010	3,680	1,720	1,720	653	1,640	2,700	304	14,900	688
27	5,930	2,410	2,230	3,450	1,570	1,300	653	1,430	2,230	268	17,600	618
28	4,460	2,600	1,640	3,220	1,570	1,800	618	1,240	1,880	286	12,400	618
29	3,680	5,020	1,570	3,010	1,430	1,500	585	1,060	1,300	304	8,280	762
30	3,330	7,920	1,570	2,800	.....	1,300	552	1,060	946	438	3,680	653
31	3,220	.....	1,720	2,700	.....	1,180	.....	1,000	.....	388	4,190	.....

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Monthly discharge of Colorado River at Marble Falls, Tex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	23,400	68	6,960	428,000
November	71,500	725	9,470	564,000
December	34,800	438	4,110	253,000
January	22,100	688	5,110	314,000
February	7,920	762	2,110	117,000
March	26,400	598	4,610	283,000
April	9,700	438	2,460	146,000
May	26,100	1,120	7,270	447,000
June	31,000	1,080	13,000	774,000
July	41,800	1,240	8,210	505,000
August	16,100	449	4,150	255,000
September	84,200	725	10,900	649,000
The year	84,200	68	6,510	4,740,000
1919-20.				
October	46,000	2,600	11,400	701,000
November	24,000	2,320	5,360	319,000
December	5,930	1,570	2,560	157,000
January	18,000	1,430	4,670	287,000
February	2,600	1,430	2,180	125,000
March	1,800	1,060	1,310	80,600
April	1,060	552	732	43,600
May	26,100	552	6,980	429,000
June	2,700	585	1,190	70,800
July	848	268	501	30,800
August	20,900	413	5,350	329,000
September	27,700	618	5,310	316,000
The year	46,000	268	3,980	2,890,000

COLORADO RIVER AT AUSTIN, TEX.

LOCATION.—At Congress Avenue concrete viaduct in Austin, Travis County, half a mile below Shoal Creek and above mouth of Waller Creek, 1 mile below mouth of Barton Creek, and 3½ miles below Austin dam.

DRAINAGE AREA.—34,200[4] square miles (measured on standard topographic maps; post-route map; and topographic map of Texas, compiled in 1899 by Robert T. Hill, of the United States Geological Survey; scale, 1 inch=25 miles).

RECORDS AVAILABLE.—February 15, 1898, to December 31, 1911; October 1, 1914, to September 30, 1920. September 1, 1895, to April 7, 1900, at Austin dam. Records of stage have been obtained by United States Weather Bureau since July 1, 1903.

GAGE.—Stevens water-stage recorder installed April 26, 1918, on downstream side of pier of viaduct, inspected by engineers from United States Geological Survey. Record of depth of water on crest of dam 3½ miles above Austin was kept Aug. 13, 1895, to April 7, 1900. Gage used February 15, 1898, to December 31, 1911, was a vertical staff, attached to bathhouse on left bank of river 150 feet above Congress Avenue bridge; during this period high-stage readings were made by means of a gage painted on first pier from left end of bridge, and a chain gage attached to bridge. From October 1, 1914, to June 18, 1915, the vertical gage of United States Weather Bureau was read. Record from June 18, 1915, to April 25, 1918, was obtained by means of Dexter water-stage recorder installed at end of viaduct. All gages at or near bridge have been referred to same datum.

DISCHARGE MEASUREMENTS.—Made by wading, or from upstream side of Montopolis highway bridge, 4 miles below gage.

[4] Revised since publication of Water-Supply Paper 308.

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CHANNEL AND CONTROL.—Channel straight for 1,000 feet above and 500 feet below gage. Right bank of medium height, composed of clay and gravel, clean, improved by city, and subject to overflow; left bank resembles right bank except that it is high and nearly vertical in places. Bed composed of rock, gravel, and sand; clean; shifts. Control is a gravel and rock shoal, 500 feet below gage; changes during high water, and also during low water because of the removal of sand for municipal use.

EXTREMES OF DISCHARGE.—Maximum stage from water-stage recorder during year ending September 30, 1919, 19.5 feet at 9 a. m. November 9 (discharge, 74,800 second-feet); minimum stage, 0.40 foot at midnight October 11 (discharge, 95 second-feet).

Maximum stage from water-stage recorder during year ending September 30, 1920, 13.7 feet at 11 p. m. October 11 (discharge, 50,300 second-feet); minimum stage, 0.87 foot at 10 p. m. July 29 (discharge, 378 second-feet).

1898–1911; 1914–1920: Maximum stage recorded, 33.5 feet during flood of April 7, 1900, which destroyed the dam. The discharge at that time has been computed by means of the formula[5] $Q=clh^{3/2}$ to be 122,000 second-feet ($c=3.09$, $l=1,091$ feet; $h=11$ feet). Recent computations indicate that the discharge probably exceeded 122,000 second-feet, but there are insufficient data to enable a more exact determination to be made. Minimum stage, 0.18 foot at 6 p. m. August 18, 1918 (discharge, 2.2 second-feet).

ICE.—None.

DIVERSIONS.—Records of the Board of Water Engineers for the State of Texas show that approximately 36,000 acres of land have been declared irrigated by diversions above station. Most of the area irrigated is in the upper basin of the main stream and adjacent to large tributaries. Little water is diverted between Austin and Columbus.

REGULATION.—Flow entirely regulated at times by operation at the Austin dam, about 3½ miles upstream. Neither sluice gates, crest gates, nor power plant at the dam were in operation during the years ending September 30, 1919 and 1920. Capacity of reservoir about 24,000 acre-feet.

ACCURACY.—Stage-discharge relation not permanent. Numerous measurements were made throughout the period. Standard rating curve well defined between 20,000 and 30,000 second-feet, and fairly well defined between 30,000 and 75,000 second-feet. Operation of water-stage recorder satisfactory except for breaks in record. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or by planimeter, by shifting-control method, or for days of considerable fluctuation, by applying gage heights for fractional parts of a day to rating table. See footnote to daily-discharge table. Records good.

From recent information it is believed that the discharge as published in Water-Supply Paper 408 for December 13–26, 1914, and February 9–17, 1915, is too low. Discharge on these days probably exceeded 20 second-feet.

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[5] U. S. Geol. Survey Water-Supply Paper 50, p. 337.

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Discharge measurements of Colorado River at Austin, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 14	McCashin and Congdon.	8.64	23,900	Oct. 9	D. A. Dudley	6.33	18,600
16	.....do	3.88	7,650	11	Dudley and Snow	12.08	42,700
18	Gowans and Kinnison.	2.32	3,090	Nov. 15	L. D. Snow	3.04	5,830
Nov. 9	R. J. Hank	19.03	[a] 74,000	Dec. 13	T. Twichell	2.39	3,270
12	Congdon and Kinnison.	16.85	[a] 61,100	1920.			
13	Congdon and Gowans.	5.64	[a] 13,000	Jan. 3	T. Twichell	2.02	2,190
18	E. P. Congdon	2.35	3,270	17	.....do	3.54	7,240
Dec. 2	H. B. Kinnison	1.74	1,710	31	Twichell and Pritchett.	2.72	4,440
14	Gowans and Kinnison.	2.26	3,750	Feb. 14	Kinnison and Dudley.	2.50	3,590
31	Congdon and Kinnison.	2.12	2,630	Mar. 2	T. Twichell	2.04	2,620
1919.				20	.....do	1.76	1,730
Jan. 23	R. J. Hank	7.31	21,500	Apr. 14	.....do	1.50	1,150
25	Hank and Congdon	8.28	[b] 25,100	24	.....do	1.34	1,040
Feb. 11	A. K. Gowans	2.00	2,300	May 1	.....do	1.30	737
28	.....do	1.81	1,780	8	.....do	1.53	1,210
Mar. 14	R. J. Hank	1.56	1,320	22	.....do	3.28	6,440
27	C. E. McCashin	6.23	[c] 16,600	June 9	McCashin and Twichell.	1.80	1,690
May 5	R. J. Hank	2.08	2,800	22	T. Twichell	1.68	1,630
21	.....do	2.97	5,260	July 7	.....do	1.42	1,210
28	Hank and Powers	5.24	13,700	21	.....do	1.00	516
June 14	Ellsworth and Quarles.	10.02	30,000	31	.....do	.95	447
Aug. 13	T. Twichell	1.74	1,760	Aug. 24	.....do	4.86	12,700
Sept. 10	Ellsworth and Twichell.	1.69	1,400	Sept. 18	.....do	1.78	1,970

[a] Surface velocities observed and coefficient of 0.87 used to reduce to mean velocity.
[b] Surface velocities observed and coefficient of 0.85 used to reduce to mean velocity.
[c] Surface velocities observed and coefficient of 0.90 used to reduce to mean velocity.

Daily discharge, in second-feet, of Colorado River at Austin, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19												
1	472	11,000	1,970	2,220	4,230	1,610	5,870	2,970	3,530	13,300	3,060	6,300
2	288	5,160	1,720	2,000	3,480	1,520	6,830	3,980	2,970	9,820	2,720	4,570
3	312	2,860	1,440	1,900	3,200	1,440	7,580	3,140	3,340	8,640	2,470	3,310
4	247	2,020	1,240	1,760	4,260	1,460	5,060	3,340	2,660	6,610	2,220	2,660
5	205	1,580	1,100	1,630	9,250	1,440	3,890	3,310	2,150	4,940	2,070	2,200
6	140	1,320	988	1,460	6,060	1,400	4,010	5,720	2,380	4,010	1,920	1,900
7	140	1,260	922	1,400	4,100	1,540	6,240	3,480	3,110	5,370	1,780	1,720
8	130	17,100	890	1,300	3,310	1,500	6,210	4,820	2,660	23,400	1,700	1,610
9	127	62,300	840	1,240	2,780	1,380	4,480	10,800	2,500	8,010	1,560	1,500
10	123	50,200	810	1,170	2,500	1,340	3,590	7,260	3,000	4,570	1,630	1,420
11	123	64,700	750	1,110	2,280	1,610	3,220	6,090	5,810	3,360	1,760	1,320
12	1,380	56,700	750	1,060	2,150	1,560	2,890	8,990	18,400	7,950	2,200	1,170
13	10,000	17,100	1,030	1,020	1,970	1,420	2,610	12,700	27,600	5,810	1,720	1,130
14	23,000	5,900	3,640	1,110	1,880	1,280	2,250	10,800	29,500	3,340	1,480	990
15	19,000	3,820	6,210	1,670	1,740	1,220	3,450	10,400	23,400	3,080	1,320	1,180
16	8,380	4,380	3,700	1,560	1,650	1,240	3,480	9,250	10,500	2,800	1,170	3,080
17	4,970	4,820	2,550	2,410	1,850	1,150	2,970	11,200	11,500	2,330	1,060	7,080
18	4,350	3,080	2,040	4,070	2,360	1,130	2,520	11,600	7,300	2,410	1,000	6,710
19	3,730	2,100	1,880	4,380	3,590	1,130	2,150	10,600	9,440	2,150	1,020	8,100
20	3,030	1,720	2,520	4,070	3,640	1,080	1,830	7,330	19,300	1,970	1,220	5,870
21	2,470	1,400	6,060	4,040	3,110	988	1,650	6,340	16,000	4,010	2,890	6,490
22	2,200	1,320	8,010	11,400	2,860	939	1,500	10,100	12,900	24,200	7,390	6,370
23	1,720	1,200	12,500	20,700	2,470	956	1,380	7,200	19,500	39,200	24,100	19,500
24	7,950	1,110	41,500	20,800	2,300	1,020	1,280	4,480	16,000	32,100	16,800	46,100
25	22,800	1,060	23,000	23,800	2,020	16,000	1,180	3,280	18,300	28,600	9,440	64,200
26	26,900	1,040	12,100	14,300	1,850	24,800	1,110	3,060	21,500	20,800	7,200	34,100
27	15,600	1,020	6,830	7,610	1,760	18,100	1,060	11,800	31,000	9,570	8,260	15,800
28	7,450	1,120	4,880	6,240	1,650	24,500	1,000	13,600	27,700	5,780	6,240	10,000
29	5,190	1,400	3,700	7,480	.....	21,500	1,080	7,330	22,000	4,570	7,580	8,260
30	8,990	1,780	2,970	8,350	.....	11,300	1,340	6,400	18,200	3,820	12,500	6,860
31	13,400	.....	2,800	5,620	.....	6,370	.....	5,130	.....	3,420	10,200	.....

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Daily discharge, in second-feet, of Colorado River at Austin, Tex., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20												
1.....	6,020	6,800	6,990	2,330	4,230	2,500	1,880	720	1,480	1,700	599	4,160
2.....	5,400	6,960	6,060	2,200	4,100	2,580	1,650	720	1,400	1,440	651	5,440
3.....	4,940	13,000	5,900	2,170	4,010	2,550	1,580	720	1,380	1,280	638	5,120
4.....	4,600	10,600	5,130	2,120	3,920	2,220	1,460	677	1,850	1,170	638	4,330
5.....	4,350	8,040	4,410	2,330	3,790	2,220	1,380	664	3,060	1,540	651	3,380
6.....	5,720	7,260	4,100	2,410	3,640	2,220	1,380	1,020	2,720	1,380	720	3,890
7.....	6,490	6,640	4,010	2,970	3,590	2,220	1,320	1,340	2,250	1,180	10,400	3,380
3.....	6,340	6,180	3,950	4,380	3,530	2,220	1,320	1,150	1,970	1,060	28,100	5,220
9.....	18,200	8,140	3,820	4,350	3,480	1,970	1,320	4,830	1,650	922	9,150	20,000
10.....	29,100	27,400	3,700	4,010	3,450	1,970	1,280	15,900	1,400	856	4,570	24,400
11.....	44,600	16,800	3,560	3,730	3,360	1,970	1,300	9,990	1,200	810	3,140	23,100
12.....	40,000	9,790	3,390	4,230	3,390	2,300	1,280	6,800	1,100	735	2,660	14,100
13.....	18,100	7,730	3,220	13,400	3,420	2,040	1,150	13,100	1,040	856	2,580	10,600
14.....	11,600	6,640	3,310	15,100	3,560	2,040	1,150	18,500	1,110	988	4,040	6,460
15.....	10,600	5,720	3,030	10,900	3,640	1,800	1,200	16,100	1,100	906	4,070	3,670
16.....	10,300	5,160	2,750	8,350	3,560	1,830	1,220	20,600	1,060	735	3,860	2,830
17.....	20,300	4,910	2,470	7,110	3,480	1,780	1,150	18,200	988	651	5,400	2,330
18.....	22,300	4,750	2,470	6,490	3,340	1,800	1,180	11,300	1,000	638	5,590	1,950
19.....	22,300	4,570	2,170	5,990	3,200	1,760	1,150	8,350	1,020	599	5,620	1,720
20.....	14,400	4,410	3,000	5,500	3,140	1,720	1,130	10,600	939	549	5,840	1,560
21.....	10,800	4,100	3,000	5,190	3,060	1,700	1,060	10,300	1,150	505	6,810	1,380
22.....	9,310	4,010	3,000	4,910	3,000	1,650	1,060	6,340	1,580	472	11,100	1,300
23.....	9,790	3,920	3,000	5,400	2,970	1,650	1,020	4,230	1,480	432	11,800	1,180
24.....	17,700	3,790	3,000	5,720	2,920	1,650	1,040	3,340	1,400	432	12,500	1,130
25.....	22,300	3,760	2,720	7,080	2,830	1,850	988	2,860	1,380	441	9,600	1,080
26.....	21,600	3,760	2,720	6,460	2,750	2,070	972	2,520	1,480	483	6,400	956
27.....	12,300	3,890	2,440	5,500	2,660	2,970	856	2,220	2,750	461	10,400	873
28.....	8,830	4,070	2,170	5,190	2,440	2,800	795	1,970	2,470	472	15,100	750
29.....	7,880	3,920	2,170	4,850	2,470	3,140	765	1,800	2,380	423	11,500	677
30.....	7,420	4,690	2,170	4,600	.....	2,550	780	1,630	2,070	405	8,540	664
31.....	7,110	.....	1,920	4,380	.....	2,100	.....	1,500	.....	450	5,720	.....

NOTE.—No record Oct. 18–23, 1918, and Feb. 28 to Mar. 3, 1919; gage heights interpolated. Indirect method for shifting control used Oct. 12–23, Nov. 1–7, Dec. 1–22, 1918; Jan. 16 to Feb. 1, Feb. 19 to Mar. 12, Mar. 25 to June 11, June 14 to July 21, Aug. 30 to Sept. 22, Oct. 8, 1919, to Feb. 19, 1920, Feb. 22 to Mar. 15, Apr. 13 to May 30, and June 4 to Sept. 27, 1920. Daily discharge determined by applying to rating table hourly gage heights on the following dates: Oct. 9–13, 17, 26, Nov. 9–11, 1919; May 9–11, 13–17, Aug. 7–9, 21 and 27, Sept. 8–9 and 11–12, 1920. Discharge partly estimated, owing to incomplete record: Jan. 1–4; Mar. 2–3, 29–31, Apr. 5–6, 1920. Gage heights obtained from U. S. Weather Bureau staff-gage records: Dec. 14–31, 1919; Jan. 13–16, Feb. 28–29, Mar. 1 and 4–15, 1920.

Monthly discharge of Colorado River at Austin, Tex., for the years ending Sept. 30, 1919 and 1920

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	26,900	123	6,280	386,000
November	64,700	1,020	11,100	660,000
December	41,500	750	5,200	320,000
January	23,800	1,020	5,450	335,000
February	9,250	1,650	3,010	167,000
March	24,800	939	4,960	305,000
April	7,580	1,000	3,120	186,000
May	13,600	2,970	7,310	449,000
June	29,500	2,150	13,100	780,000
July	39,200	1,970	9,680	595,000
August	24,100	1,000	4,760	293,000
September	64,200	990	9,380	558,000
The year	64,700	123	6,950	5,030,000

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Monthly discharge of Colorado River at Austin, Tex., for the years ending Sept. 30, 1919 and 1920—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919-20.				
October	44,600	4,350	14,200	873,000
November	27,400	3,760	7,050	420,000
December	6,990	1,920	3,410	210,000
January	15,100	2,120	5,460	336,000
February	4,230	2,440	3,340	192,000
March	3,140	1,650	2,120	130,000
April	1,880	765	1,190	70,800
May	20,600	664	6,450	397,000
June	3,060	939	1,600	95,200
July	1,700	405	806	49,600
August	28,100	599	6,720	413,000
September	24,400	664	5,260	313,000
The year	44,600	405	4,820	3,500,000

Days of deficiency in discharge of Colorado River at Austin, Tex., for the years ending Sept. 30, 1902–1910 and 1915–1920.

Discharge in second-feet.	Days of deficient discharge.														
	1901–2	1902–3	1903–4	1904–5	1905–6	1906–7	1907–8	1908–9	1909–10	1914–15	1915–16	1916–17	1917–18	1918–19	1919–20
100	.....	.....	.....	.....	.....	45	.....	.....	36	26	3	45	39	.....	.....
200	1	.....	3	20	45	103	1	34	55	44	29	81	182	6	.....
300	20	10	22	75	135	204	11	94	102	68	52	203	233	9	.....
400	68	30	130	150	185	228	41	156	165	72	97	264	247	10	.....
500	167	59	189	177	198	253	78	195	228	83	145	281	260	11	10
600	216	77	223	196	207	261	92	203	241	95	177	290	273	11	14
700	236	90	243	218	221	292	142	226	266	112	222	298	286	11	24
800	251	108	259	234	224	300	166	234	279	120	239	303	301	13	34
900	263	122	266	242	231	305	179	244	281	135	257	313	308	16	39
1,000	271	148	273	247	234	310	190	250	294	142	272	315	315	22	47
1,200	284	197	286	263	241	315	225	273	307	205	289	321	326	51	73
1,400	292	218	292	273	247	323	256	293	319	240	300	333	327	70	91
1,600	301	232	300	282	255	327	261	299	321	255	310	341	332	91	104
1,800	313	247	305	291	263	331	271	310	321	262	315	343	335	112	116
2,000	317	260	309	296	267	334	276	317	322	262	318	343	336	123	130
3,000	330	307	322	315	291	342	299	332	335	289	338	351	347	170	183
4,000	338	321	332	327	301	345	317	342	338	307	346	355	354	207	231
5,000	341	331	337	334	314	347	322	347	341	314	353	358	355	229	263
6,000	343	340	342	339	320	348	329	349	343	324	355	363	356	242	284
7,000	344	344	346	342	323	348	331	352	345	338	358	363	357	261	301
8,000	347	346	348	345	325	348	336	354	350	347	359	364	357	276	308
9,000	349	350	350	347	330	348	340	355	352	348	360	364	358	286	314
10,000	353	351	352	348	335	352	344	356	354	349	362	365	360	292	320
20,000	356	360	359	359	350	363	351	362	364	355	365	.....	363	333	352
30,000	361	362	364	363	359	365	357	365	365	357	366	.....	364	355	364
40,000	365	365	365	364	362	.....	361	.....	.....	362	.....	.....	365	358	364
50,000	.....	.....	366	364	362	.....	362	.....	.....	362	.....	.....	.....	360	366
60,000	.....	.....	.....	365	364	.....	364	.....	.....	363	.....	.....	.....	362	.....
75,000	.....	.....	.....	.....	365	.....	366	.....	.....	364	.....	.....	.....	365	.....
100,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	365	.....	.....	.....	.....	.....

EVAPORATION NEAR AUSTIN, TEX.

LOCATION.—At reservoir on Hill ranch, 1,000 feet from ranch house, 5 miles south of Austin, Travis County. Elevation, 475 feet above sea level.

RECORDS AVAILABLE.—April, 1916, to September 30, 1920.

EQUIPMENT.—Two evaporation pans, one floating on surface of reservoir and the other on land about 30 feet from reservoir; auxiliary equipment consists of hook gage, rain gage, anemometer, maximum and minimum thermometers, and psychrometer.

ACCURACY.—Observations made daily at 8 a. m. Observer's work good

COOPERATION.—Computations made by United States Weather Bureau.

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Evaporation near Austin, Tex., for the years ending Sept. 30, 1919 and 1920.

Month.	Temperature (° F.).					Mean relative humidity (per cent).	Wind.		Rainfall (inches).	Evaporation (inches).	
	Air.			Water.			Average velocity (miles per hour).	Prevailing direction.		Floating pan.	Land pan.
	Mean maximum.	Mean minimum.	Mean.	Floating pan (mean).	Land pan (mean).						
1919.											
October	81.4	58.0	69.7	66.0	62.9	87.1	1.9	East	3.56	3.314	5.882
November	63.8	45.7	54.8	54.5	51.7	85.9	2.3	North	4.55	2.142	2.878
December	[a] 62.3	40.5	51.4	49.2	[a] 47.7	[b] 89.0	2.6	West	3.70	1.542	2.507
January	[a] 57.0	35.7	46.4	[d] 48.8	[c] 44.3	[d] 92.6	3.3	Northwest	4.63	.....	.....
February	59.9	39.5	49.7	49.7	[a] 45.9	[a] 82.1	3.4	South	2.33	2.572	1.933
March	69.4	45.3	57.4	57.1	51.9	83.9	2.8	East	2.63	3.225	4.191
April	78.1	55.4	66.8	66.2	60.5	88.0	1.7	South	3.37	4.192	5.772
May	81.3	61.5	71.4	72.2	68.1	89.0	.9	South	5.36	3.755	5.523
June	85.9	67.0	76.4	77.3	73.3	90.0	1.1	East	9.17	4.197	6.974
July	90.4	70.8	80.6	80.4	77.3	92.9	.3	South	13.86	5.172	5.785
August	92.2	70.6	81.4	82.9	81.5	92.6	.6	South	2.65	6.140	6.693
September	86.5	66.8	76.6	77.0	[d] 76.0	[a] 93.9	1.0	East	3.12	.....	4.830
The year	75.7	54.7	65.2	65.1	61.8	88.9	1.8	.....	58.93	.....	.....
1920.											
October	80.3	64.2	72.2	72.2	69.5	94.6	1.3	South	10.70	.....	3.537
November	68.9	46.5	57.7	57.7	53.1	84.9	2.0	North	1.48	2.500	3.155
December	[b] 60.8	35.8	48.3	[b] 45.8	[b] 44.8	[b] 87.7	2.7	North	1.49	1.379	1.889
January	54.1	36.1	45.1	[b] 45.9	[b] 43.1	[b] 89.9	3.3	North	5.43	1.532	1.901
February	64.6	42.9	53.8	54.1	48.9	86.3	2.8	North	.41	1.986	2.733
March	71.5	44.1	57.8	56.4	50.7	69.3	3.7	North	1.33	4.871	6.146
April	81.3	53.2	67.2	64.6	58.0	67.6	2.9	South	1.25	6.625	6.779
May	86.2	65.9	76.0	75.4	71.8	82.0	1.7	East	7.04	6.030	6.323
June	89.1	67.0	78.0	79.3	75.2	81.9	.6	Southeast	3.98	5.184	6.392
July	95.1	71.2	83.2	80.7	77.3	76.5	.9	South	.68	6.909	8.469
August	91.3	70.7	81.0	79.7	77.3	86.3	.5	South	3.63	5.567	6.154
September	92.1	66.8	79.4	77.2	73.7	81.2	.8	South	2.00	5.289	6.881
The year	77.9	55.4	66.6	65.8	62.0	82.4	1.9	.....	39.42	.....	60.359

[a] One day missing. [b] Two days missing. [c] Three days missing. [d] Four days missing.

NOTE.—Evaporation from floating pan estimated for parts of February, March, August, September, November, 1919; January, February, March, May, August, and September, 1920. Evaporation from land pan estimated for parts of February, July, August, October, and November, 1919; January and March, 1920.

COLORADO RIVER AT COLUMBUS, TEX.

LOCATION.—At county highway bridge half a block from county jail, 400 feet below Galveston, Harrisburg & San Antonio Railway bridge, in eastern edge of Columbus. Colorado County.

DRAINAGE AREA.—37,000 square miles [6] (measured on standard topographic maps; post-route map; and topographic map of Texas, compiled in 1899 by Robert T. Hill, of the United States Geological Survey; scale, 1 inch=25 miles).

RECORDS AVAILABLE.—August 2, 1902, to December 31, 1911; May 22, 1916, to September 30, 1920. Records of stage have been obtained by the United States Weather Bureau since January 1, 1903.

GAGE.—Gurley graph water-stage recorder, inspected by A. S. Lowrey. From August 2, 1902, to December 16, 1907, gage heights were obtained by measuring with a tagged chain and lead weight from point on top of bridge pier to water surface. Mott tape and weight gage on downstream handrail of bridge, property of the United States Weather Bureau, was read from December 17, 1907, to February 9, 1917, when regulation United States Geological Survey chain gage was installed and used until present Gurley water-stage recorder was installed on April 30, 1919. All gages referred to same datum.

[6] Revised since publication of Water-Supply Paper 308.

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DISCHARGE MEASUREMENTS.—Made from upstream side of bridge or by wading.

CHANNEL AND CONTROL.—Channel straight above and below station for 400 feet. Right bank composed of firm earth; high and not subject to overflow. Left bank of medium height; overflow likely. Bed of stream clean and sandy; shifts. A sand and gravel section 350 feet below gage may serve as low-water control; the stage-discharge relation during medium and high stages may be controlled by a bend in river below bridge.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 33.9 feet at 7 a. m. November 14 (discharge, 55,100 second-feet); minimum stage, 5.35 feet at 7 a. m. October 7 (discharge, 94 second-feet).

Maximum stage recorded during year ending September 30, 1920, 34.6 feet at 6 a. m. October 14 (discharge, 55,800 second-feet); minimum stage, 7.18 feet from 4 a. m. to 6 p. m. July 28 (discharge, 639 second-feet).

1902–1911; 1916–1920: Maximum stage recorded, 35.8 feet April 27, 1908 (revised discharge, 60,300 second-feet); minimum stage, 4.2 feet September 9 and 10, 1910 (discharge, 10 second-feet).

DIVERSIONS.—Considerable water is diverted for irrigation in the drainage basin above Austin, but between Austin and Columbus little water is diverted. The station is above the irrigated rice belt, which comprises several thousand acres. Records of the Board of Water Engineers for the State of Texas show that about 36,000 acres have been declared irrigated above Austin.

REGULATION.—Flow at Columbus during low stages partly controlled by storage at Lake Austin.

ACCURACY.—Stage-discharge relation not permanent. Rating curve fairly well defined below 55,000 second-feet. Gage read to hundredths twice daily to April 30, 1919, after that date operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Mean of two readings a day may not be true index of daily gage height. Mean daily gage heights obtained from recorder graph by inspection or by use of planimeter. Daily discharge ascertained by applying mean daily gage height to rating table, or by shifting-control method. Records fair for low and medium stages. By comparison with records on Colorado River at Wharton, it appears probable that discharge above 20,000 second-feet may be too high.

COOPERATION.—Morning gage readings from October 1, 1918, to April 30, 1919, furnished by United States Weather Bureau.

Discharge measurements of Colorado River at Columbus, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 10	McCashin and Congdon	6.90	608	June 24	H B. Kinnison	23.28	26,100
Nov. 13	H. B. Kinnison	33.32	[a] 54,400	July 9	do	17.02	[b] 17,400
14	do	33.97	56,600	Aug. 6	do	10.34	3,610
14	do	33.39	52,400	29	do	13.99	9,390
15	do	24.18	21,800	Oct. 7	Gowans and Snow	12.37	5,360
15	do	22.59	19,100	Dec. 19	H. B. Kinnison	11.54	[c] 6,250
1919.				1920.			
Jan. 4	C. E. McCashin	9.58	2,870	Feb. 25	Kinnison and Pritchett	10.36	3,260
20	Ellsworth and Kinnison	9.94	2,760	May 13	H. B. Kinnison	14.16	8,710
				July 1	do	9.62	2,410
Apr. 21	C. E. McCashin	9.28	2,590	Aug. 4	Ellsworth and Kinnison	7.48	838
May 30	Ellsworth and Kinnison.	16.28	11.300				

[a] Surface velocity observed and coefficient of 0.94 used to reduce to mean velocity.
[b] Surface velocity observed and coefficient of 1.00 used to reduce to mean velocity
[c] Made during rising stage.

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Daily discharge, in second-feet, of Colorado River at Columbus, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1....	2,600	8,660	1,310	4,080	8,140	2,200	12,000	1,260	7,680	27,200	6,380	12,500
2....	2,690	12,600	1,430	3,720	6,880	2,100	8,180	1,860	13,300	24,100	5,460	10,500
3....	1,420	10,700	1,600	3,180	5,140	1,990	7,310	1,610	11,400	17,300	4,840	7,440
4....	862	7,560	1,940	2,710	4,440	1,880	10,800	2,430	6,440	14,700	4,250	5,840
5....	540	5,050	1,680	2,290	4,180	1,750	8,040	3,380	4,680	12,800	3,810	4,680
6....	470	3,730	1,580	2,180	3,810	1,690	5,920	2,860	4,190	10,700	3,440	3,930
7....	185	2,890	1,290	1,930	8,140	1,700	4,770	8,950	3,540	8,750	3,120	3,690
8....	3,420	2,410	1,160	1,880	6,730	1,660	4,540	24,500	3,100	8,070	2,870	3,460
9....	1,170	5,770	1,010	1,530	5,050	1,440	5,280	13,400	3,420	14,100	2,710	3,220
10....	570	31,100	960	1,440	4,100	1,610	7,220	7,900	11,800	19,400	3,280	2,990
11....	364	46,000	843	1,360	3,570	1,610	5,830	11,200	10,400	10,700	2,940	2,750
12....	1,160	49,200	882	1,200	3,310	1,440	4,310	15,500	9,000	7,870	3,070	2,520
13....	595	52,900	4,360	1,200	3,370	1,520	3,610	18,700	7,050	6,310	2,630	2,280
14....	372	54,300	7,290	1,120	2,860	1,540	3,280	13,400	.....	8,660	2,500	2,120
15....	392	28,200	4,700	1,360	2,580	1,620	2,820	13,200	.....	8,640	2,760	2,720
16....	14,900	11,800	2,050	17,700	2,450	1,520	2,520	11,500	.....	6,260	2,400	3,990
17....	15,900	8,300	4,080	7,170	2,300	1,420	2,320	11,500	.....	5,210	2,200	3,970
18....	10,400	6,370	4,050	4,440	2,280	1,320	3,290	12,100	.....	5,420	2,000	3,300
19....	6,460	6,580	3,440	2,280	2,860	1,260	3,210	14,100	.....	5,320	1,900	6,400
20....	5,040	5,680	2,890	2,070	3,570	1,240	2,390	13,000	.....	4,270	1,800	7,480
21....	3,650	6,000	2,960	4,100	3,480	1,200	2,340	12,000	.....	4,380	2,260	8,440
22....	2,760	4,130	1,920	10,500	5,050	1,200	2,100	8,970	27,600	29,600	4,150	7,550
23....	2,170	2,710	2,620	17,200	3,860	1,090	1,970	7,440	26,400	33,200	7,380	11,900
24....	2,140	2,100	9,150	17,900	3,430	1,100	1,880	.....	25,200	46,100	19,000	30,700
25....	2,700	3,460	32,800	18,100	3,200	1,290	1,720	.....	28,200	46,900	22,700	41,600
26....	5,590	3,020	33,800	22,300	2,920	1,400	1,610	15,100	37,600	38,100	15,200	48,500
27....	24,100	2,000	20,100	20,400	2,720	21,500	1,490	12,500	46,300	32,200	10,500	53,000
28....	22,300	1,680	12,100	12,700	2,450	18,100	1,390	6,280	43,400	22,600	8,700	44,000
29....	12,900	1,480	8,210	8,350	.....	19,200	1,360	9,780	38,100	13,800	8,750	21,900
30....	8,860	1,340	6,500	6,640	.....	24,500	1,470	13,200	34,100	9,610	7,530	14,800
31....	6,640	.....	5,230	7,220	.....	19,400	.....	8,700	.....	7,650	7,730	.....
1919–20.												
1....	10,800	7,530	3,790	2,800	5,950	2,800	2,950	960	2,410	2,460	888	8,390
2....	8,750	6,860	4,030	2,800	5,650	2,800	2,500	960	2,500	2,360	800	6,550
3....	7,190	6,250	6,700	2,700	5,360	2,700	2,410	993	3,790	2,140	698	5,220
4....	6,250	6,250	7,020	2,650	5,220	2,700	2,100	993	3,000	1,900	740	5,220
5....	10,400	11,000	5,950	2,800	5,080	2,600	1,780	960	2,320	1,740	836	5,650
6....	6,860	9,480	5,500	6,700	4,940	2,600	1,670	993	2,180	1,600	843	5,080
7....	5,220	7,530	4,940	7,700	4,800	2,410	1,600	993	2,800	1,520	856	4,410
8....	10,800	6,700	4,540	6,100	4,670	2,320	1,520	1,300	4,030	1,820	1,020	3,910
9....	8,750	6,100	4,410	6,100	4,540	2,280	1,520	2,460	3,910	1,670	11,200	4,280
10....	7,190	6,550	4,280	5,800	4,540	2,280	1,440	3,670	2,900	1,440	16,400	5,800
11....	24,400	14,300	4,280	5,080	4,410	2,230	1,370	2,320	2,600	1,410	9,670	18,600
12....	44,900	24,100	4,030	16,400	4,940	2,180	1,370	11,400	2,320	1,300	6,100	22,300
13....	51,400	14,100	3,910	30,000	4,540	2,140	1,300	10,200	2,100	1,160	4,670	19,700
14....	54,000	10,000	3,790	17,100	4,280	2,140	1,300	12,100	1,900	1,090	6,100	13,900
15....	39,800	8,040	3,550	16,600	4,280	2,100	1,260	25,300	1,780	1,060	4,800	11,800
16....	35,500	6,860	3,440	14,600	4,280	2,050	1,230	22,100	1,710	1,020	3,790	8,390
17....	47,000	6,100	3,330	11,400	4,410	2,010	1,200	29,500	1,670	1,060	4,030	5,950
18....	38,400	5,500	3,330	9,290	4,410	1,970	1,160	24,400	1,630	1,060	3,670	4,540
19....	29,500	5,220	4,280	7,700	4,280	1,930	1,120	16,600	1,780	993	3,670	3,670
20....	27,100	4,940	7,870	6,860	4,150	1,860	1,090	12,700	1,670	928	4,940	3,110
21....	22,500	4,670	5,500	6,400	3,910	1,780	1,060	9,860	1,740	869	5,220	2,600
22....	16,600	4,540	3,910	5,950	3,790	1,780	1,060	11,000	1,740	843	5,650	2,280
23....	13,300	4,410	3,790	9,110	3,670	1,740	1,020	10,600	1,670	812	6,700	2,050
24....	11,200	4,150	3,670	43,100	3,550	1,740	993	7,360	2,050	788	10,800	1,930
25....	11,600	4,030	3,550	39,100	3,330	1,780	993	5,500	2,800	728	11,800	1,780
26....	19,200	4,150	3,550	13,100	3,220	1,740	960	4,280	2,500	692	11,400	1,710
27....	23,300	3,790	3,330	10,400	3,110	1,780	941	3,550	1,900	656	8,930	1,630
28....	18,600	3,550	3,220	8,930	3,000	1,860	941	5,650	1,820	639	6,860	1,560
29....	12,000	3,670	3,110	7,530	2,900	2,010	947	4,670	1,820	764	9,670	1,440
30....	9,480	3,790	3,000	6,860	.....	2,650	947	3,000	2,460	686	13,700	1,340
31....	8,390	.....	3,000	6,400	.....	2,750	.....	2,500	.....	788	10,400	.....

NOTE.—Discharge interpolated June 23 and Sept. 7–12, 1919. Discharge estimated as follows: May 21 and 25, 1919, 25,000 second-feet; and June 14–21, 1919, 27,000 second-feet. Discharge determined by shifting-control method Oct. 1 to Dec. 10, 1919; Jan. 16 to Aug. 20, and Sept. 11–30, 1920. Discharge partly estimated owing to incomplete record, Jan. 12–13, 23–21, June 23–26, July 7–9, 1920. U. S. Weather Bureau gage readings used in determining discharge Dec. 20–26, 1919; May 8–13, 1920.

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Monthly discharge of Colorado River at Columbus, Tex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	24,100	185	5,270	324,000
November	54,300	1,340	12,900	768,000
December	33,300	843	5,920	364,000
January	22,300	1,120	6,780	417,000
February	8,140	2,280	4,030	224,000
March	24,500	1,090	4,600	283,000
April	12,000	1,360	4,170	248,000
May	.....	1,260	11,200	689,000
June	.....	3,100	20,600	1,230,000
July	46,900	4,270	16,400	1,010,000
August	22,700	1,800	5,750	354,000
September	53,000	2,120	12,600	750,000
The year	54,300	185	9,200	6,660,000
1919-20.				
October	54,000	5,220	20,700	1,270,000
November	24,100	3,550	7,140	425,000
December	7,870	3,000	4,280	263,000
January	43,100	2,650	10,900	670,000
February	5,950	2,900	4,320	248,000
March	2,800	1,740	2,180	134,000
April	2,950	941	1,390	82,700
May	29,500	960	8,030	494,000
June	4,080	1,630	2,320	138,000
July	2,460	639	1,230	75,600
August	16,400	698	6,030	371,000
September	22,300	1,340	6,160	367,000
The year	54,000	639	6,250	4,540,000

COLORADO RIVER AT WHARTON, TEX.

LOCATION.—At highway bridge in western edge of Wharton, Wharton County, 200 feet below Galveston, Harrisburg & San Antonio Railway bridge.

DRAINAGE AREA.—37,400 square miles (measured on standard topographic maps, post-route map: and topographic map of Texas, compiled in 1899 by Robert T. Hill, of the United States Geological Survey; scale, 1 inch=25 miles

RECORDS AVAILABLE.—July 12 to August 31, 1916; July 3 to August 18, 1917; July 11 to August 4, 1918; and March 19, 1919, to September 30, 1920.

GAGE.—Gurley 7-day water-stage recorder attached to pier of highway bridge near left bank, installed March 19, 1919. Prior to this date, vertical staff on right bank 75 feet below bridge. Elevation of zero of old staff gage, 1.93 feet higher than zero of recorder.

DISCHARGE MEASUREMENTS.—Made from highway or railway bridge or by wading.

CHANNEL AND CONTROL.—Channel straight above and below station for a few hundred feet. Bed composed of sand and clay, and liable to shift. Both banks medium in height, composed of clay, and subject to overflow during extreme stages.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 32.45 feet at midnight June 18 (discharge, 37,600 second-feet, determined from extension of rating curve); minimum stage, 5.01 feet at 8 a. m. March 25 (discharge, 1,420 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 33.9 feet at midnight October 15 (discharge, 39,600 second-feet, ascertained from extension of rating curve); minimum stage, 4.95 feet at 6 p. m. July 29 (discharge, 518 second-feet).

1916-1920. Maximum stage recorded during periods of record, 33.9 feet at midnight, October 15, 1919 (discharge, 39,600 second-feet, determined from extension of rating curve); minimum stage, −0.90 foot at 7 a. m. August 1, 1917 (discharge 62 second-feet).

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ICE.—None.

DIVERSION.—Station is in area of rice irrigation, roughly estimated to cover about 75,000 acres, about one-third of which is irrigated by diversion from Colorado River between Columbus and Wharton, and the remaining two-thirds by diversions below Wharton. During periods of maximum demand, practically the entire flow is diverted, unless the river is above ordinary stage.

REGULATION.—Flow at low and medium stages is regulated to some extent by storage in Austin Lake.

ACCURACY.—Stage-discharge relation changed during high water in September, 1919. Rating curve used during year ending September 30, 1919, fairly well defined between 200 and 30,000 second-feet; curve used for year ending September 30, 1920, well defined from 200 to 15,000 second-feet, fairly well defined to 30,000 second-feet, and extended above. Operation of water-stage recorder satisfactory, except as shown in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height, determined by inspecting gage-height graph, or on days of considerable fluctuation by use of planimeter. Records good, except during extremely high stages.

Discharge measurements of Colorado River at Wharton, Tex., during the years ending Sept 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Jan. 23	Ellsworth and Kinnison	15.56	[a] 12,500	Aug. 13	H. B. Kinnison	8.09	3,250
Mar. 28	H. B. Kinnison	19.24	[b] 17,000	Oct. 6	do	17.47	14,400
May 6	do	7.68	3,380	Dec. 17	do	8.99	3,490
13	do	18.29	[b] 17,000				
19	do	15.56	12,700	1920.			
24	do	12.46	8,500	Feb. 27	Kinnison and Pritchett	9.13	3,760
26	do	24.00	[b] 23,300	Mar. 29	H. C. Pritchett	7.60	2,310
June 23	do	22.64	[a] 23,200	May 11	H. B. Kinnison	8.94	3,450
26	do	24.74	[a] 26,500	June 30	do	6.96	1,670
July 19	do	10.26	5,140	July 28	do	5.03	543

[a] Surface velocity observed and coefficient of 0.90 used to reduce to mean velocity.
[b] Surface velocity observed and coefficient of 0.92 used to reduce to mean velocity.

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Daily discharge, in second-feet, of Colorado River at Wharton, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919.												
1	.....	.....	.....	.....	.....	.....	15,600	1,650	8,660	29,000	8,280	9,550
2	.....	.....	.....	.....	.....	.....	9,900	1,620	7,880	23,500	7,100	12,500
3	.....	.....	.....	.....	.....	.....	7,270	1,760	14,300	19,700	6,280	9,860
4	.....	.....	.....	.....	.....	.....	7,180	1,830	10,100	15,300	5,580	7,620
5	.....	.....	.....	.....	.....	.....	10,500	2,120	6,550	13,400	4,990	6,240
6	.....	.....	.....	.....	.....	.....	8,800	3,110	4,980	11,900	4,470	5,220
7	.....	.....	.....	.....	.....	.....	6,220	2,900	5,430	10,200	4,110	4,570
8	.....	.....	.....	.....	.....	.....	5,140	15,500	3,730	8,690	3,780	4,070
9	.....	.....	.....	.....	.....	.....	4,580	18,600	3,550	8,120	3,500	3,680
10	.....	.....	.....	.....	.....	.....	5,350	11,500	6,020	17,100	3,320	3,480
11	.....	.....	.....	.....	.....	.....	6,520	7,920	15,600	15,000	3,590	3,240
12	.....	.....	.....	.....	.....	.....	5,310	11,600	11,700	10,200	3,330	3,060
13	.....	.....	.....	.....	.....	.....	4,340	16,400	8,800	7,980	3,460	2,860
14	.....	.....	.....	.....	.....	.....	3,830	15,500	11,000	6,890	3,140	2,780
15	.....	.....	.....	.....	.....	.....	3,490	12,800	20,700	9,590	2,970	2,660
16	.....	.....	.....	.....	.....	.....	3,160	12,000	26,600	8,300	3,040	3,580
17	.....	.....	.....	.....	.....	.....	2,870	11,300	32,000	6,480	2,740	4,510
18	.....	.....	.....	.....	.....	.....	2,680	10,500	36,800	5,600	2,500	5,430
19	.....	.....	.....	.....	.....	1,590	3,140	12,300	37,000	5,840	2,360	6,360
20	.....	.....	.....	.....	.....	1,570	3,290	12,900	25,200	5,570	2,260	7,280
21	.....	.....	.....	.....	.....	1,540	2,900	12,100	14,600	4,760	2,170	8,690
22	.....	.....	.....	.....	.....	1,480	2,620	10,600	20,900	9,240	2,470	8,140
23	.....	.....	.....	.....	.....	1,460	2,380	8,340	22,600	27,800	5,200	8,310
24	.....	.....	.....	.....	.....	1,440	2,190	9,610	18,000	30,300	8,730	16,100
25	.....	.....	.....	.....	.....	1,440	2,030	26,100	22,600	32,800	18,500	26,000
26	.....	.....	.....	.....	.....	1,570	1,900	23,000	25,600	35,100	18,800	30,100
27	.....	.....	.....	.....	.....	10,000	1,900	14,200	30,000	33,700	13,400	32,800
28	.....	.....	.....	.....	.....	16,900	1,730	10,600	33,000	28,500	10,500	35,400
29	.....	.....	.....	.....	.....	15,400	1,680	6,600	34,400	18,800	9,090	35,700
30	.....	.....	.....	.....	.....	19,600	1,6:0	11,100	32,400	12,700	9,120	22,200
31	.....	.....	.....	.....	.....	22,100	.....	11,500	.....	9,960	7,860	.....
1919-20.												
1	13,700	9,030	4,160	3,050	7,860	3,350	3,050	1,200	3,450	2,060	650	10,100
2	10,800	8,250	4,380	2,960	7,470	3,250	3,150	1,200	3,150	2,330	690	8,510
3	9,030	7,600	4,600	2,960	6,950	3,150	2,960	1,130	3,250	2,330	650	6,950
4	7,990	6,950	7,470	2,870	6,590	3,150	2,780	1,130	3,950	2,150	690	5,750
5	7,240	7,600	7,080	2,780	6,350	3,050	2,600	1,130	3,750	1,970	690	5,630
6	13,100	11,200	6,350	3,050	6,110	2,960	2,240	1,130	2,960	1,730	740	5,990
7	10,500	9,420	5,870	7,340	5,870	2,960	2,060	1,060	2,690	1,570	790	5,510
8	7,600	7,730	5,150	8,380	5,630	2,870	1,970	1,270	2,960	1,410	890	4,820
9	12,000	6,950	4,710	6,590	5,390	2,780	1,890	1,270	4,050	1,810	1,000	4,270
10	9,030	6,470	4,490	6,830	5,270	2,780	1,890	2,330	4,270	1,810	14,400	4,490
11	10,800	7,340	4,380	6,350	5,150	2,780	1,890	3,350	3,450	1,650	13,100	8,510
12	24,900	18,300	4,270	6,830	5,040	2,690	1,890	4,380	2,960	1,490	8,770	17,600
13	31,200	18,600	4,160	21,600	5,510	2,600	1,810	11,000	2,600	1,490	7,470	18,900
14	35,300	12,600	4,050	23,000	5,150	2,600	1,810	8,770	2,240	1,340	5,270	15,900
15	38,800	10,600	3,950	15,700	4,820	2,600	1,730	15,800	1,970	1,270	6,830	12,900
16	38,400	9,800	3,750	15,700	4,710	2,600	1,650	22,200	1,810	1,130	5,270	11,000
17	34,400	9,010	3,550	13,600	4,710	2,510	1,570	21,900	1,650	1,000	4,160	8,380
18	36,100	8,220	3,450	11,200	4,820	2,420	1,570	24,000	1,570	940	4,160	6,590
19	36,000	7,420	3,550	9,680	4,820	2,420	1,490	18,900	1,340	890	3,950	5,270
20	29,200	6,630	5,150	8,770	4,710	2,330	1,490	14,800	1,340	840	3,850	4,380
21	24,800	5,830	6,470	8,250	4,490	2,240	1,490	12,000	1,340	740		3,750
22	19,600	5,040	5,150	7,860	4,380	2,240	1,410	10,300	1,270	690		3,350
23	15,400	4,710	3,950	7,730	4,160	2,150	1,410	10,600	1,340	690		3,050
24	12,900	4,600	3,750	22,500	4,050	2,150	1,410	10,900	1,200	650	8,400	2,780
25	11,600	4,380	3,650	33,700	3,950	2,150	1,340	10,800	1,490	650		2,510
26	13,800	4,380	3,550	34,800	3,750	2,060	1,340	10,100	2,870	610		2,330
27	19,200	4,270	3,550	16,100	3,650	2,060	1,340	9,550	2,780	610		2,240
28	21,200	4,050	3,450	12,200	3,550	2,060	1,270	9,030	2,060	570	8,770	2,060
29	16,400	3,950	3,350	10,300	3,450	2,240	1,200	7,990	1,810	570	7,210	1,970
30	11,900	3,950	3,250	9,160	.....	2,240	1,200	5,750	1,730	590	10,900	1,810
31	10,200	.....	3,150	8,380	.....	2,780	.....	4,050	.....	650	12,700	.....

NOTE.—Mar. 30 to Apr. 1, 1919, gage heights partly estimated. Sept. 16-19, Nov. 16-21, 1919; July 4 and 11, 1920, discharge interpolated. Discharge estimated, Aug. 21-27, 1920; partly estimated, owing to incomplete records, Nov. 22, 1919; May 8, June 4, 5, 12, 19, 20, 25, 26, July 3, 4, 10-12, and Aug. 28, 1920.

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Monthly discharge of Colorado River at Wharton, Tex., for the years ending Sept. 30, 1919 and 1920

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919.				
March 19–31	22,100	1,440	7,390	191,000
April	15,600	1,660	4,670	278,000
May	26,100	1,620	10,600	652,000
June	37,000	3,550	18,400	1,090,000
July	35,100	4,760	15,500	953,000
August	18,800	2,170	6,020	370,000
September	35,700	2,660	11,100	660,000
The period				4,190,000
1919–20.				
October	38,800	7,340	19,100	1,170,000
November	18,600	3,950	7,830	466,000
December	7,470	3,150	4,440	273,000
January	34,800	2,780	11,300	695,000
February	7,880	3,450	5,120	295,000
March	3,350	2,060	2,590	159,000
April	3,150	1,200	1,830	109,000
May	24,000	1,060	8,360	514,000
June	4,270	1,200	2,440	145,000
July	2,330	570	1,230	75,600
August	13,100	650	5,880	362,000
September	18,900	1,810	6,580	392,000
The year	38,800	570	6,420	4,660,000

NORTH CONCHO RIVER AT SAN ANGELO, TEX.

LOCATION.—At county concrete viaduct in San Angelo, Tom Green County, 1 mile above confluence of North Concho and South Concho rivers.

DRAINAGE AREA.—7,530 square miles (measured on post-route map and topographic map of Texas, compiled in 1899 by Robert T. Hill, of the United States Geological Survey; scale, 1 inch=25 miles).

RECORDS AVAILABLE.—October 27, 1915, to September 30, 1920.

GAGE.—Stevens continuous water-stage recorder, attached to left side of web of third pier of viaduct from left bank, installed September 1, 1920; inspected by engineers of United States Geological Survey. Prior to this date, gage used was vertical staff, attached to same pier; read by C. F. Payne, John Z. German, and Tom Savell. Both recorder and staff gage referred to same datum.

DISCHARGE MEASUREMENTS.—Made from second highway bridge upstream from gage or by wading 400 feet below.

CHANNEL AND CONTROL.—Bed composed of solid rock which is, to some extent, covered in high-water channel with grass and moss. Channel straight for 800 feet above and 400 feet below gage. Banks are sloping, clean, composed of rock and clay, and not subject to overflow except during high floods. About 20 feet below gage and at downstream side of viaduct is a concrete dam about 4½ feet high, which, before the viaduct was constructed, served as part of low-water crossing; this dam forms an artificial control and insures a permanent stage-discharge relation.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 5.5 feet at 5 p. m. October 25 (discharge, 7,370 second-feet, determined from extension of rating curve); no flow for several periods during the year.

Maximum stage recorded during year ending September 30, 1920, 5.0 feet at 10 a. m. October 7 (discharge, 6,070 second-feet, determined from extension of rating curve); no flow July 23 to August 2.

1916–1920: Maximum stage recorded, 5.5 feet at 5 p. m. October 25, 1918 (discharge, 7,370 second-feet, determined from extension of rating curve); no flow for several periods during record.

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ICE.—None.

DIVERSIONS.—Records of the Board of Water Engineers for the State of Texas show that about 600 acres have been declared irrigated by diversions from North Concho River, all above station.

REGULATION.—None of consequence.

ACCURACY.—Stage-discharge relation permanent except from June 19 to August 26, 1920, when control was partly washed out. Rating curve well defined below 125 second-feet; above 125 second-feet it was determined by the formula $Q=CLH^{3/2}$ for broad-crested weirs, using a value of 2.20 for C, and may be subject to error. Gage supposed to have been read to hundredths once daily, and oftener during floods prior to installation of water-stage recorder on September 1, 1920; readings were not entirely reliable. Operation of water-stage recorder satisfactory, except as shown in footnote to daily-discharge table. Mean daily gage heights determined from recorder graph by inspection. Daily discharge determined by applying mean daily gage height to rating table except as noted in footnote to daily-discharge table. Records fair except during extremely low and high stages, when large errors are possible.

Discharge measurements of North Concho River at San Angelo, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Oct. 8	Kinnison and Gowans	.....	0	Jan. 6	D. A. Dudley	0.90	21.8
				Mar. 24	do	.83	13.3
1919.				Apr. 9	do	.78	9.0
Jan. 11	Ellsworth and Congdon	0.62	1.6	May 27	do	.72	6.1
May 16	J. E. Powers	.86	16.8	July 7	do	a.26	.3
June 19	C. E. Ellsworth	1.21	177	Aug. 3	do	a.57	4.7
Aug. 4	Dudley and Twichell	.60	2.8				
Nov. 7	D. A. Dudley	.97	30.5				

a Control partly washed out June 19, 1920. Stage of zero flow at 0.0 feet on gage from June 19 to 10.30 a. m. Aug. 27, 1920, when control was repaired, and stage of zero flow raised to its former height of about 0.30 foot on gage.

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Daily discharge, in second-feet, of North Concho River at San Angelo, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	0	0.4	.....	.....	5.3	2.3	158	31	1.7	98	1.7	9.8
2	0	0	.....	.....	5.3	2.3	252	31	1.3	47	.9	4.5
3	0	0	.....	.....	5.3	2.3	2,740	31	1.1	26	1.3	2.3
4	0	0	.....	.....	4.9	2.3	465	31	1.1	70	1.9	.8
5	0	0	.....	.....	4.5	2.3	305	28	.5	98	1.7	.2
6	0	0	.....	.....	4.5	2.3	228	26	.6	87	.9	0
7	0	257	.....	.....	4.5	2.3	117	41	1,190	47	.6	0
8	0	398	.....	.....	3.9	2.3	98	36	64	688	.3	0
9	0	138	.....	.....	3.9	1.9	47	36	3,160	158	.2	0
10	1,420	64	.....	.....	3.9	1.9	47	36	500	9.8	.1	0
11	580	22	.....	1.7	3.9	1.9	41	.....	252	22	.1	0
12	715	9.8	.....	1.7	3.9	1.7	36	.....	138	24	0	0
13	64	4.5	.....	1.7	3.9	1.7	36	.....	87	11	0	0
14	.1	1.9	.....	1.9	3.9	1.7	36	.....	33	9.8	0	0
15	0	1.9	.....	2.5	3.9	1.7	33	.....	516	7.2	0	0
16	0	1.9	.....	2.9	3.9	1.7	31	14	580	4.5	0	47
17	0	.....	.....	4.9	3.9	1.7	31	14	138	3.2	0	.....
18	0	.....	.....	6.2	3.9	1.7	31	9.8	110	1.9	0	.....
19	0	.....	.....	6.2	3.9	1.7	31	12	278	1.9	0	.....
20	4.5	.....	.....	5.8	3.2	1.7	31	5.3	269	1,060	0	.....
21	4,580	.....	.....	5.3	3.2	1.7	31	3.9	261	305	0	500
22	1,500	.....	.....	5.3	3.5	1.7	31	2.3	252	80	0	158
23	228	.....	.....	6.2	2.7	1.7	31	2.3	365	33	0	80
24	117	.....	.....	5.3	2.7	1,410	31	41	195	22	.1	47
25	80	.....	.....	5.3	2.7	2,430	31	26	87	9.8	228	9.8
26	760	.....	.....	4.5	2.5	252	31	6.6	54	6.6	278	12
27	1,810	.....	.....	4.5	2.3	117	33	4.5	98	4.5	228	14
28	335	.....	.....	5.8	2.3	98	31	2.9	158	3.9	98	9.8
29	80	.....	.....	4.5	.....	47	31	2.9	150	2.9	64	9.8
30	1.9	.....	.....	6.2	.....	47	31	1.9	98	1.9	22	9.8
31	.4	.....	.....	5.3	.....	117	.....	1.3	.....	1.9	9.8	.....
1919–20.												
1	9.8	22	22	22	9.8	16	6.6	4.5	1.9	4.9	0	1.9
2	8.5	22	22	22	9.8	16	6.6	4.5	1.9	3.3	0	3.5
3	5.3	22	22	22	9.8	16	6.6	4.5	4.5	3.3	4.1	1.7
4	4.5	22	22	22	9.8	16	6.6	4.5	4.5	1.8	1.2	1.4
5	3.9	22	22	22	9.8	16	9.8	1.3	2.9	1.8	.8	1.5
6	3,680	22	22	22	9.8	16	9.8	.9	1.9	.8	.4	1.4
7	4,840	22	22	22	9.8	16	9.8	.9	1.9	.8	.4	2.5
8	2,630	22	22	22	9.8	16	9.8	.9	1.9	.5	.4	3.6
9	1,060	22	22	22	9.8	16	9.8	.9	1.9	.4	.3	4.7
10	580	22	22	22	9.8	16	9.8	9.8	1.3	.4	.3	5.8
11	294	22	22	22	9.8	16	8.5	9.8	.9	.4	.3	6.9
12	47	22	22	22	9.8	16	8.5	4.5	.9	.4	1	7.9
13	47	19	22	22	9.8	16	8.5	2.9	.9	.4	24	6.6
14	465	14	22	22	9.8	16	8.5	1.9	.9	.2	4.1	4.5
15	305	14	22	22	9.8	16	8.5	1.9	.6	.2	50	14
16	117	14	22	22	9.8	16	8.5	1.9	.4	.2	66	16
17	80	14	22	22	9.8	16	7.2	1.9	.4	.1	540	9.8
18	41	14	22	9.8	9.8	16	6.6	1.9	.4	.1	231	6.2
19	73	14	22	9.8	9.8	14	6.6	1.9	60	.1	7.5	3.9
20	80	14	22	9.8	9.8	14	6.6	1.9	24	.1	4.9	2.5
21	150	14	22	9.8	9.8	14	6.6	1.9	13	.1	4.9	1.7
22	252	19	22	22	16	12	5.3	1.9	7.5	.1	13	1.3
23	252	22	22	22	16	12	4.5	1.9	18	0	9.6	1.1
24	252	22	22	22	16	12	4.5	1.9	7.5	0	102	.8
25	64	22	22	22	16	11	4.5	1.9	7.5	0	36	.5
26	47	22	22	22	16	9.8	4.5	1.9	7.5	0	24	.4
27	41	22	22	9.8	16	9.8	4.5	1.9	7.5	0	14	.4
28	33	22	22	9.8	16	4.5	4.5	1.9	5.9	0	9.2	.4
29	26	22	22	9.8	16	4.5	4.5	1.9	4.9	0	4.5	.3
30	22	22	22	9.8	.....	9.8	4.5	1.9	4.9	0	4.5	.3
31	22	.....	22	9.8	.....	8.5	.....	1.9	.....	.....	1.9	.....

NOTE.—Gage readings Nov. 17, 1918, to Jan. 10, 1919, unreliable; mean discharge probably not over 2 second-feet. Discharge, May 11–15, 1919, estimated 30 second-feet; Sept. 17–20, 1919, 200 second-feet. Discharge interpolated for following days: June 20, 21, Nov. 8, 9, 1919; Jan. 1, 2, and Sept. 7–11, 1920. Discharge, Sept. 6 and 12, 1920, partly estimated; gage-height record incomplete. Records below 5 second-feet in 1919 subject to uncertainty owing to unreliability of gage readings.

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Monthly discharge of North Concho River at San Angelo, Tex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	4,580	0	396	24,300
November 1–16	398	0	56.2	1,780
January 11–31	6.2	1.7	4.46	186
February	5.3	2.3	3.79	210
March	2,430	1.7	147	9,040
April	2,740	31	170	10,100
May	41	1.3	20.2	1,240
June	3,160	.5	301	17,900
July	1,060	1.9	95	5,840
August	278	0	30.2	1,860
September	.....	0	57.2	3,400
1919–20.				
October	4,840	3.9	501	30,800
November	22	14	19.7	1,170
December	22	22	22	1,350
January	22	9.8	18.5	1,140
Febuary	16	9.8	11.5	662
March	16	4.5	13.7	842
April	9.8	4.5	7.04	419
May	9.8	.9	2.71	167
June	60	.4	6.61	393
July	4.9	0	.66	39
August	540	0	37.4	2,300
September	16	.3	3.78	225
The year	4,840	0	54.4	39,500

CONCHO RIVER NEAR SAN ANGELO, TEX.

LOCATION.—Half a mile below confluence of North Concho and South Concho rivers, 1¾ miles southeast of San Angelo, Tom Green County.

DRAINAGE AREA.—10,800 square miles (measured on standard topographic maps; post-route map; and topographic map of Texas, compiled in 1899 by Robert T. Hill, of United States Geological Survey; scale, 1 inch =25 miles).

RECORDS AVAILABLE.—September 17, 1915, to September 30, 1920.

GAGE.—Stevens continuous water-stage recorder, installed August 9, 1917, on right bank, 1,500 feet below an old ford; inspected by engineers of United States Geological Survey. Prior to August 9, 1917, a vertical staff gage in several sections attached to trees on left bank was used. Water-stage recorder and vertical staff gage referred to same datum.

DISCHARGE MEASUREMENTS.—Made by wading or from cable near gage.

CHANNEL AND CONTROL.—Bed composed of solid rock and gravel. Channel straight for 1,000 feet above and below station. Right bank high, rocky, wooded, and not subject to overflow; left bank of medium height, composed of clay and gravel, covered with a scattered growth of trees, and subject to overflow at high stages. Rapids just below gage serve as control for medium and low stages; control for high stages not known.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 26.6 feet July 8, determined from flood marks on gage house (discharge, 40,500 second-feet, determined by slope method, assuming a value of 0.045 for n in Kutter's formula); minimum stage, 0.45 foot at 4 p. m. October 6 (discharge, 0.1 second-foot).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 18.52 feet at 3 p. m. October 6 (discharge, about 14,500 second-feet); minimum stage, 0.50 foot at midnight July 24 (discharge, 1.8 second-feet).

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1915–1920: Maximum stage recorded, 26.6 feet July 8, 1919, determined from flood marks on gage house (discharge, 40,500 second-feet, determined from slope method, assuming a value of 0.045 for *n* in Kutter's formula); minimum discharge, 0.1 second-foot at 4 p. m. October 6, 1918.

ICE.—None.

DIVERSIONS.—Flow at low stage materially affected by diversions above station. About a mile above mouth of South Concho River a storage dam has been constructed by the San Angelo Light & Power Co. for waterworks. Records of the Board of Water Engineers for the State of Texas show that about 7,500 acres have been declared irrigated by water above the station, and about 3,500 acres by diversions below station.

REGULATION.—Storage at the dam of the San Angelo Light & Power Co. has slight effect on flow at station; no regulation of consequence on North Concho River.

ACCURACY.—Stage-discharge relation practically permanent, except when affected by aquatic growth on control. Rating curve well defined below 800 second-feet; above, it is based on determination of discharge (40,500 second-feet), at crest of flood on July 8, 1919, using Kutter's formula with the value of 0.045 for *n*, and is subject to error. Between 800 and 40,500 second-feet curve was drawn with discharge as a function of $A\sqrt{d}$. Operation of water-stage recorder unsatisfactory as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height, determined by inspecting gage-height graph, or for days of considerable fluctuation by use of planimeter, or by indirect method for shifting control during periods when aquatic growth affected stage-discharge relation or as otherwise noted in footnote to daily-discharge table. Records good for low and medium stages and poor for high stages.

Discharge measurements of Concho River near San Angelo, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Oct. 7	Kinnison and Gowans..	0.60	1.6	Nov. 15	D. A. Dudley.....	1.64	78.0
				Jan. 5	.....do.....	1.74	98.8
1919.				Mar. 21	.....do.....	1.63	71.5
Jan. 11	Ellsworth and Congdon	1.28	28.8	Apr. 8	.....do.....	1.28	32.9
May 14	J. E. Powers.....	1.73	95.5	May 27	.....do.....	.99	16.7
June 19	C. E. Ellsworth.....	2.26	240	June 19	.....do.....	3.22	[b] 586
20	.....do.....	3.47	790	July 7	.....do.....	.66	4.50
July 8	Dudley and Twichell..	26.60	[a] 40,500	Sept. 2	.....do.....	2.39	290
Aug. 4	.....do.....	1.38	39.0				

[a] Discharge determined by slope method, using a value of 0.045 for *n* in Kutter's formula.
[b] Made during falling stage

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Daily discharge, in second-feet, of Concho River near San Angelo, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	0.7	134	14			20	160	23	46	945	57	34
2	1.0	122	14			23	108	21	49	.....	46	28
3	.8	108	18			51	2,020	19	46	.....	38	21
4	.8	90	19		35	42	960	18	33	.....	37	19
5	.7	84				35	272	50	32	.....	31	17
6	.6	78		30		28	146	42	29	.....	16	10
7	1.5	404				6.8	94	57	801	.....	12	8.3
8	1.3	544			29	3.8	74	194	185	.....	6.6	7.9
9	1.4	154			31	3.0	67	103	3,750	.....	4.5	7.6
10	1,620	76			31	3.4	51	57	6,300	.....	4.0	7.9
11	1,780	15			33	3.3	48	536	1,600	.....	244	7.9
12	724	14		25	42	3.7	38	1,000	480	.....	86	7.6
13	152	12		22	28	3.8	33	300	258	.....	37	6.0
14	62	11		24	24	4.0	33	122	188	.....	16	4.2
15	37	9.5		26	24	4.0	27	74	680	.....	5.0	86
16	33	8.3		38	25	4.0	23	64	1,910	.....	3.1	774
17	38	7.9		44	24	4.7	22	46	500	.....	2.7	404
18	29	7.9	30	41	24	3.8	21	49	296	.....	3.3	316
19	19	8.3		37	25	6.3	21	67	332	.....	3.7	97
20	368	7.9		36	22	3.8	20	37	580	.....	738	76
21	4,680	6.8		134	24	4.0	21	29	464	.....	227	630
22	2,460	7.4		132	21	5.2	21	28	598	.....	272	516
23	752	7.9		60	21	5.5	20	26	1,650	.....	424	792
24	352	9.1		45	22	837	18	1,340	684	.....	78	251
25	204	10		39	21	3,970	18	436	440	.....	204	149
26	886	10		38	21	1,730	19	152	440	.....	380	117
27	1,840	11		38	21	508	25	92	1,850	.....	178	103
28	626	12		38	19	230	27	70	1,530	86	86	94
29	304	12		37	.....	130	27	62	738	78	97	92
30	194	13		37	.....	101	25	57	734	74	64	90
31	152	.....		37	.....	166	.....	50	.....	67	44	.....
1919-20.												
1	84	.....	74	78	92	80	35	12	10	22	2.2	80
2	82	.....	70	80	92	70	34	12	14	14	5.7	251
3	76	.....	74	82	92	67	38	12	12	10	10	122
4	78	.....	78	80	92	65	37	12	15	12	4.2	82
5	74	.....	82	99	92	59	39	12	22	14	3.7	88
6	6,430	.....	82	99	94	60	35	10	44	6.6	3.4	92
7	6,800	.....	84	97	94	65	33	12	37	3.5	3.3	140
8	2,380	120	84	90	92	65	35	12	28	3.8	2.8	188
9	608	101	80	84	90	64	31	11	20	4.0	2.5	149
10	416	84	80	84	94	70	35	26	14	3.5	2.4	105
11	404	82	82	112	94	62	30	16	15	3.7	2.4	
12	424	80	84	112	101	53	23	18	12	5.0	35	
13	265	78	80	101	101	54	22	16	16	3.7	214	
14	.....	80	82	92	97	51	22	18	22	3.5	53	60
15	.....	82	82	90	92	39	26	18	16	3.1	227	
16	.....	86	86	88	86	35	22	19	12	2.5	286	
17	.....	82	88	86	88	33	24	18	16	3.0	468	
18	.....	80	92	84	88	33	22	16	9.1	2.3	140	50
19	.....	76	97	84	88	33	19	16	424	2.5	67	50
20	.....	79	92	86	88	37	18	16	152	2.5	49	48
21	.....	82	90	78	88	34	16	14	68	2.4	82	44
22	.....	90	86	97	88	38	14	13	50	2.4	608	44
23	.....	99	84	97	86	45	12	17	1,300	2.3	576	45
24	.....	84	80	92	84	62	18	22	276	2.1	742	42
25	.....	78	80	90	80	41	19	18	108	2.0	223	
26	.....	70	80	90	80	38	19	20	80	2.4	127	
27	.....	72	80	88	84	39	17	16	67	2.4	94	40
28	.....	92	78	88	82	33	15	11	53	2.4		
29	.....	86	80	90	80	36	13	14	45	2.3	80	
30	.....	80	80	90	.....	37	12	14	30	2.5		
31	.....	.....	78	92	.....	38	.....	12	.....	2.4		

NOTE.—No record Oct. 14 to Nov. 7, 1919 (discharge ranged between 3,530 and 74 second-feet as shown by maximum and minimum gage heights). Discharge partly estimated owing to breaks in record: Nov. 8, 21, Dec. 2, and 4, 1919; Aug. 27, Sept. 2, 10, and 18, 1920. Discharge interpolated Nov. 20 and Dec. 3, 1919. Indirect method for shifting control used during the following periods: Oct. 1–9, 1918; Mar. 26 to Aug. 11, and Sept. 18–30, 1920. Braced figures show estimated mean discharge for periods included.

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Monthly discharge of Concho River near San Angelo, Tex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	4,680	0.6	559	34,400
November	544	6.8	66.5	3,960
December	.....	.....	28.2	1,730
January	134	.....	40.6	2,500
February	.....	19	27.8	1,540
March	3,970	3.0	256	15,700
April	2,020	18	149	8,870
May	1,340	18	168	10,300
June	6,300	29	907	54,000
August	738	2.7	111	6,830
September	774	4.2	159	9,460
1919–20.				
October, 1–13	6,800	74	1,390	35,800
November, 8–30	120	70	84.5	3,850
December	97	70	82.2	5,050
January	112	78	90.3	5,560
February	101	80	89.6	5,150
March	80	33	49.5	3,040
April	39	12	24.5	1,460
May	26	10	15.3	941
June	1,300	9.1	99.6	5,920
July	22	2.0	4.86	299
August	742	2.2	140	8,610
September	251	.....	76.0	4,520

CONCHO RIVER NEAR PAINT ROCK, TEX.

LOCATION.—At Concho, San Saba & Llano Valley Railroad bridge a quarter of a mile below mouth of Kickapoo Creek and 2 miles northwest of Paint Rock, Concho County.

DRAINAGE AREA.—11,800 square miles (measured on standard topographic maps; post-route map; and topographic map of Texas, compiled in 1899 by Robert T. Hill, of United States Geological Survey; scale, 1 inch=25 miles).

RECORDS AVAILABLE.—September 20, 1915, to September 30, 1920.

GAGE.—Stevens continuous water-stage recorder attached to downstream end of middle pier of railroad bridge, installed September 16, 1920, inspected by engineers of United States Geological Survey. Prior to September 16, 1920, gage was vertical staff, attached to same pier; read by Oscar Skaggs.

DISCHARGE MEASUREMENTS.—Made by wading or from downstream side of bridge.

CHANNEL AND CONTROL.—Bed composed of solid rock, smooth, clean, free from vegetation, and permanent. Channel straight for 500 feet above and below gage. Right bank 30 feet high, solid rock, clean, and not subject to overflow; left bank of medium height, sloping, wooded, and subject to overflow during high water. Permanent control during low and medium stages at a shoal in solid rock, 400 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 13.5 feet at 7.30 a. m. June 10 (discharge, 21,300 second-feet); no flow, October 1–9.

Maximum stage recorded during year ending September 30, 1920, 12.0 feet at 9.30 a. m. October 7 (discharge, 16,900 second-feet); minimum stage, 0.80 foot, August 1–5 (discharge, 0.80 second-foot).

1915–1920: Maximum stage recorded, 13.5 feet at 7.30 a. m. June 10, 1919 (discharge, 21,300 second-feet); no flow during periods of every year except 1920.

ICE.—None.

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DIVERSIONS.—Records of the Board of Water Engineers for the State of Texas show that about 11,000 acres have been declared irrigated by diversions from Concho River, practically all of which are above the station. Flow during low stages is materially affected by diversions.

REGULATION.—Ten storage dams of small capacity are located between this station and San Angelo. An abandoned dam, 12 feet in height, known as "Four-Mile dam," is 4 miles below San Angelo, and a small dam, 8 feet in height, has been constructed for storage on Sims ranch just above the station. None of the dams appreciably affect the flow by storing water, except during extremely low stages.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 1,000 second-feet; fairly well defined between 1,000 and 6,000 second-feet, and extended above. Gage read to hundredths once a day to September 7, 1920. No record September 8–15; discharge interpolated. September 16–30, Stevens water-stage recorder; operation satisfactory. Daily discharge ascertained by applying mean daily gage height to rating table, except as noted above. Records good except for extremely high stages.

Discharge measurements of Concho River near Paint Rock, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height	Discharge.
1918.		*Ft.*	*Sec.-ft.*	1920.		*Ft.*	*Sec.-ft.*
Oct. 5	Kinnison and Gowans..	0.57	0	Jan. 17	D. A. Dudley.....	1.78	104
				Apr. 8	.....do.....	1.28	19.0
1919.				July 1	.....do.....	1.48	42.0
Jan. 9	Ellsworth and Congdon	1.38	31.3	Sept. 17	.....do.....	1.64	72.2
May 13	J. E. Powers.....	2.70	457				
Aug. 6	Dudley and Twichell...	1.33	23				
Nov. 12	D. A. Dudley.....	1.78	98.6				

Daily discharge, in second-feet, of Concho River near Paint Rock, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1....	0	66	20	44	37	19	79	159	37	720	68	29
2....	0	58	19	30	165	19	441	30	37	315	62	29
3....	0	55	19	29	70	18	5,620	20	37	235	53	28
4....	0	51	19	28	62	44	2,460	19	37	165	40	27
5....	0	44	20	28	58	38	432	16	37	135	30	26
6....	0	38	20	28	55	34	113	13	37	108	24	25
7....	0	7,240	20	28	49	30	103	11	235	83	19	23
8....	0	2,030	21	28	55	29	98	8.2	500	30	13	21
9....	0	333	21	28	43	19	70	7.5	8,010	7,210	12	20
10....	3,480	315	21	27	38	12	62	6.8	15,200	1,720	10	19
11....	5,320	295	21	26	30	11	57	2,820	3,810	720	7.9	19
12....	1,280	130	21	26	28	9.2	4,220	1,500	500	315	7.9	17
13....	600	44	21	25	26	7.5	44	235	275	165	4.8	16
14....	360	41	21	30	25	6.5	33	108	182	156	.1	16
15....	58	36	21	38	37	5.5	26	672	150	135	.1	16
16....	44	33	21	37	41	5.1	23	275	4,340	122	.1	1,450
17....	36	30	30	34	38	4.6	19	62	500	108	4.8	1,120
18....	30	28	75	41	33	4.1	17	30	275	100	13	525
19....	28	26	53	41	29	3.8	16	900	900	96	8.2	165
20....	26	24	44	38	25	3.6	15	600	450	3,480	4.8	150
21....	5,240	22	37	38	24	3.4	13	198	600	970	.8	575
22....	6,810	20	37	1,200	23	4.8	12	34	660	550	108	600
23....	1,540	19	37	153	22	4.6	11	30	4,690	198	810	900
24....	963	25	37	79	22	2,300	9.2	11,400	810	165	360	525
25....	600	24	37	68	21	7,210	6.8	1,540	900	135	108	235
26....	500	23	37	55	21	2,820	4.8	235	235	108	900	165
27....	2,240	22	37	44	20	1,580	4.3	108	4,160	100	550	135
28....	900	21	37	49	20	970	44	83	1,200	96	405	122
29....	600	21	37	46	.....	191	20	44	1,720	88	165	96
30....	360	20	37	43	.....	159	500	44	1,280	81	4.8	62
31....	165	.....	62	38	.....	98	.....	44	.....	75	30	.....

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Daily discharge, in second-feet, of Concho River near Paint Rock, Tex., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	62	182	108	83	98	77	24	11	14	40	0.8	75
2	62	165	108	81	98	77	22	11	14	30	.8	98
3	53	153	108	81	98	75	22	11	14	20	.8	220
4	44	141	108	79	98	72	20	11	17	16	.8	135
5	37	130	106	113	98	72	20	11	16	13	.8	135
6	8,010	119	103	108	98	72	19	11	16	12	9.2	108
7	12,700	108	103	106	98	70	19	9.6	16	11	4.8	103
8	7,690	575	103	100	103	70	19	9.2	26	10	3.4	101
9	840	260	103	98	103	68	16	9.2	26	11	2.4	98
10	500	159	103	98	103	68	12	9.2	23	11	1.8	96
11	500	122	100	103	103	66	12	9.2	20	11	1.4	93
12	405	103	98	106	100	66	25	9.2	19	11	6.2	91
13	360	100	96	106	100	62	22	9.2	14	10	6.8	89
14	275	98	96	124	100	55	19	9.2	13	10	243	87
15	198	96	96	122	100	51	16	9.2	14	9.2	1,630	85
16	159	106	103	113	98	44	13	20	13	8.2	780	83
17	441	106	103	108	93	43	11	17	12	8.2	291	75
18	315	103	103	103	88	41	11	16	14	8.2	165	66
19	191	103	103	96	88	38	11	15	13	8.2	119	57
20	165	103	108	96	88	37	11	14	275	10	83	51
21	275	103	106	96	88	36	11	16	108	9.2	62	49
22	6,410	106	106	122	86	36	11	16	62	8.2	44	46
23	1,450	106	100	113	83	34	11	15	2,240	8.2	378	44
24	970	106	93	108	83	34	11	14	840	7.5	1,280	44
25	387	103	88	98	83	62	11	13	235	7.5	550	43
26	198	103	93	96	83	58	11	13	119	7.5	251	41
27	185	103	90	96	83	51	11	13	83	6.2	135	38
28	159	100	86	108	83	34	11	12	70	3.8	108	37
29	135	108	83	103	79	30	11	12	58	2.1	96	37
30	119	108	83	98	.....	28	11	12	48	1.4	88	43
31	108	.....	83	93	.....	25	.....	12	.....	1.4	79	.....

Monthly discharge of Concho River near Paint Rock, Tex., for the years ending Sept. 30, 1919 and 1920.

Month	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	6,810	0	1,010	62,100
November	7,240	19	371	22,100
December	62	19	31	1,910
January	1,200	25	79	4,860
February	165	20	40	2,220
March	7,210	3.4	505	31,100
April	5,620	4.3	486	28,900
May	11,400	6.8	686	42,200
June	15,200	37	1,730	103,000
July	7,210	30	603	37,100
August	900	.1	123	7,560
September	1,450	16	239	14,200
The year	15,200	0	493	357,000
1919–20.				
October	12,700	37	1,400	86,100
November	575	96	139	8,270
December	108	83	99	6,090
January	124	81	102	6,270
February	103	79	93	5,350
March	77	25	53	3,260
April	24	11	15	892
May	20	9.2	12	738
June	2,240	12	148	8,810
July	40	1.4	11	676
August	1,630	.8	207	12,700
September	220	37	79	4,700
The year	12,700	.8	198	143,000

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SAN SABA RIVER AT MENARD, TEX.

LOCATION.—At steel highway bridge in Menard, Menard County, 80 miles above mouth of stream.

DRAINAGE AREA.—1,140 square miles (measured on standard topographic maps; post-route map; and topographic map of Texas, compiled in 1899 by Robert T. Hill, of the United States Geological Survey; scale, 1 inch=25 miles).

RECORDS AVAILABLE.—September 14, 1915, to September 30, 1920.

GAGE.—Chain gage attached to floor on downstream side of highway bridge; read by W. H. and W. A. Cannon or H. E. Jones.

DISCHARGE MEASUREMENTS.—Made by wading or from downstream side of bridge.

CHANNEL AND CONTROL.—Channel straight 800 feet above and 100 feet below station; water flows through a series of shoals and ponds; channel above gage somewhat obstructed by reeds and grass, but below the gage the flow is only slightly obstructed at times. Right bank composed of gravel and clay, wooded, sloping, high, and not subject to overflow; left bank similar, but low and subject to overflow. A sand and gravel ford just below gage forms a fairly permanent control during low stages, but shifts during medium and high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 13.05 feet at 8.45 a. m. November 8 (discharge not determined); minimum discharge, 4.8 second-feet, October 8.

Maximum stage recorded for year ending September 30, 1920, 7.5 feet at 7.10 a. m. August 24 (discharge not determined); minumum discharge, 11 second-feet at 6.20 p. m. July 12.

1915–1920: Maximum stage recorded, 13.6 feet at 2.30 a. m. September 16, 1915 (discharge not determined); no flow July 12–14, 19–31, Aug. 1–4, and 26–31, 1918.

ICE.—None.

DIVERSIONS.—Considerable land is irrigated with water diverted above station. Noyes canal on right side of river which serves a considerable area diverts a short distance above gage. Records of the Board of Water Engineers for State of Texas show that about 4,300 acres have been declared irrigated by diversions above the station, and about 7,700 acres by diversions below the station.

REGULATION.—Flow unregulated by storage or water-power plants but is largely controlled at low stages during irrigation season by diversion to Noyes canal.

ACCURACY.—Stage-discharge relation not permanent. Rating curve for 1919 fairly well defined below 110 second-feet; curve for 1920 fairly well defined between 25 and 250 second-feet extended above. Gage read to hundredths twice daily. Daily discharge determined by applying mean daily gage height to rating table, except as noted in footnote to daily-discharge table; indirect method for shifting control used, October 1, 1919, to September 30, 1920. Records fair below 150 second-feet and poor above.

Discharge measurements of San Saba River at Menard, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Oct. 5	Kinnison and Gowans	1.96	20.8	Jan. 20	D. A. Dudley	2.18	46.3
1919.				Mar. 6	do	2.03	28.3
Jan. 9	Ellsworth and Congdon	2.07	39.1	26	do	2.06	28.3
May 17	J. E. Powers	2.56	109	Apr. 24	do	2.20	37.7
18	do	2.29	60.1	June 1	do	2.04	31.8
July 25	Dudley and Twichell	2.00	36.1	July 10	do	2.22	58.8
Nov. 17	D. A. Dudley	2.26	59.1				

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Daily discharge, in second-feet, of San Saba River at Menard, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	17	22	40	36	39	39	27	27	25	59	41	42
2	18	23	37	36	39	40	27	28	27	58	42	44
3	15	23	36	32	39	39	27	27	25	61	42	42
4	12	24	38	32	40	40	27	27	26	58	40	40
5	20	23	34	31	39	40	27	26	25	59	42	36
6	16	25	36	33	40	39	26	27	25	58	42	36
7	6.4	25	32	32	41	39	27	27	25	402	42	36
8	4.8	.....	32	32	40	40	27	27	112	422	42	36
9	8.0	.....	31	33	40	39	26	26	.....	71	42	36
10	28	160	33	34	39	29	28	26	45	52	42	38
11	393	91	36	29	40	23	28	27	34	52	42	36
12	138	48	38	35	39	24	28	27	25	47	41	37
13	37	37	42	34	39	23	28	26	27	46	42	38
14	27	48	40	41	40	24	28	25	25	45	44	38
15	24	40	39	45	40	25	28	26	27	45	42	42
16	21	39	38	42	39	24	28	.....	35	45	42	66
17	24	42	34	39	40	24	28	212	112	47	42	91
18	19	40	33	38	40	24	28	45	89	45	42	58
19	21	38	40	37	40	25	28	36	70	46	42	55
20	22	41	49	40	39	23	28	29	114	47	42	58
21	27	38	36	37	39	24	28	26	82	54	44	120
22	27	40	40	38	40	25	26	27	.....	47	49	.....
23	22	38	44	38	40	25	28	25	153	47	47	.....
24	22	40	49	38	40	25	28	26	48	47	42	.....
25	21	55	40	38	39	26	27	27	.....	44	42	40
26	33	49	42	38	40	25	28	24	.....	42	45	35
27	35	45	39	48	40	25	26	25	64	45	45	34
28	22	40	38	41	39	26	26	25	58	44	44	33
29	18	39	38	39	.....	26	27	26	59	41	45	33
30	14	41	36	39	.....	26	26	26	58	40	42	35
31	21	.....	34	39	.....	25	.....	27	.....	41	42	.....
1919–20.												
1	39	41	55	43	42	40	29	39	31	47	38	31
2	40	43	54	43	44	37	29	37	32	45	37	34
3	40	41	54	43	44	37	29	37	33	43	36	33
4	40	40	54	44	44	35	29	34	32	39	36	33
5	41	40	54	43	44	31	29	33	33	38	37	33
6	39	42	54	43	44	28	31	33	33	40	33	31
7	39	41	55	44	44	28	31	33	33	40	35	32
8	39	42	54	43	44	29	31	32	33	42	32	32
9	40	45	54	43	43	27	30	32	33	43	30	32
10	39	49	54	43	42	29	32	32	33	57	29	31
11	40	52	54	43	42	29	30	29	33	52	28	31
12	41	54	54	44	43	28	32	26	33	18	29	30
13	39	56	54	44	41	28	32	26	35	22	31	29
14	40	56	54	43	41	28	32	26	34	21	37	27
15	41	56	52	43	43	26	30	26	34	22	568	27
16	43	56	44	40	43	26	30	26	36	21	676	26
17	49	56	42	40	42	27	31	26	35	23	187	26
18	47	56	42	38	43	27	39	26	34	21	210	26
19	41	58	42	39	43	28	40	27	35	29	88	30
20	40	58	42	40	44	27	38	26	42	31	58	29
21	38	56	42	38	42	28	38	27	47	27	50	29
22	39	58	44	38	44	26	38	28	47	26	46	27
23	39	56	42	39	44	28	38	28	47	22	49	37
24	39	56	42	40	43	26	38	28	45	26	956	36
25	39	56	42	40	42	26	39	28	46	26	191	38
26	39	55	42	40	43	26	38	27	48	27	103	41
27	41	56	43	42	43	28	38	28	49	28	55	39
28	41	56	42	42	42	72	38	28	46	31	47	40
29	44	56	44	44	42	29	37	29	46	29	43	49
30	41	56	44	42	.....	31	39	28	46	29	41	45
31	41	.....	44	44	.....	33	.....	30	.....	35	33	.....

NOTE.—Indirect method for shifting control used during following periods: Oct. 1, 1918, to May 15, June 27 to Sept. 21, 1919. Discharge for following days was not determined because stage as given was beyond limits of rating curve: Nov. 8, 1918, 13.05 feet; Nov. 9, 3.96 feet; May 16, 1919, 6.50 feet; June 9, 4.27 feet; June 22, 4.79 feet; June 25, 7.27 feet; June 26, 4.29 feet; Sept. 22, 9.45 feet; Sept. 23, 8.75 feet; and Sept. 24, 1919, 3.80 feet.

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Monthly discharge of San Saba River at Menard, Tex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	393	4.8	36.6	2,250
December	49	31	37.9	2,330
January	48	29	36.9	2,270
February	41	39	39.6	2,200
March	40	23	29.1	1,790
April	28	26	27.3	1,620
July	422	40	72.8	4,480
August	49	40	42.7	2,630
1919–20.				
October	49	38	40.6	2,500
November	58	40	51.4	3,060
December	55	42	48.2	2,960
January	44	38	41.8	2,570
February	44	41	42.9	2,470
March	72	26	30.6	1,880
April	40	29	33.8	2,010
May	39	26	29.5	1,810
June	49	31	38.1	2,270
July	57	18	32.3	1,990
August	956	28	125	7,690
September	49	26	32.8	1,950
The year	956	18	45.7	33,200

SAN SABA RIVER NEAR SAN SABA, TEX.

LOCATION.—About 200 feet above Beveridge highway bridge, 1 mile below mouth of China Creek, 2 miles northwest of San Saba, San Saba County, 3 miles below mouth of Richland Creek, and 4 miles above mouth of Simpson Creek.

DRAINAGE AREA.—3,000 square miles (measured on standard topographic maps; post-route map; and topographic map of Texas, compiled in 1899 by Robert T. Hill, of United States Geological Survey; scale, 1 inch=25 miles).

RECORDS AVAILABLE.—December 30, 1904, to December 31, 1906; September 11, 1915, to September 30, 1920. Miscellaneous discharge measurements previous to 1904.

GAGE.—Vertical and inclined staff, on right bank; read by G. M. Pool. From December 30, 1904, to December 31, 1906, gage heights were obtained by measuring with a tape from a reference point on the bridge to the water surface. Relation between datum used 1904–1906 and that of present gage is not known.

DISCHARGE MEASUREMENTS.—Made by wading or from downstream side of bridge.

CHANNEL AND CONTROL.—Channel straight above and below station for 100 feet. Bed composed of rock and gravel; shifts. Left bank composed of gravel and clay, wooded, high, and not subject to overflow; right bank consists of clay and gravel, wooded, sloping, medium in height, and subject to overflow during high water. A shoal at a ford about 75 feet below gage serves as control during medium and low stages; control is free from vegetation and shifts.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 30.7 feet September 23 (discharge, 11,700 second-feet, determined from extension of rating curve; minimum stage, 1.10 feet at 6.40 p. m. October 1 and 6.10 p. m. October 2 (discharge, 9.5 second-feet).

Maximum stage recorded during year ending September 30, 1920, 14.2 feet on night of October 16-17, determined from flood marks on gage (discharge, 4,340 second-feet); minimum stage, 1.64 feet at 6.45 p. m. July 8 (discharge, 68 second-feet).

1904–1906; 1915–1920: Maximum stage recorded, 31.7 feet August 7, 1906 (discharge not determined); no flow August 9 and 10, 1918.

ICE.—None.

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DIVERSIONS.—Considerable water is diverted from stream and tributaries above station. There are also diversions below the station, but none in vicinity of station. Flood water from Brady Creek at Brady is stored for municipal uses; capacity of reservoir not known, but probably small. Records of the Board of Water Engineers for the State of Texas show that about 9,300 acres have been declared irrigated by diversions above station and about 2,700 acres by diversions below station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Rating curves well defined between 5 and 6,500 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table; shifting-control method used October 1, 1918, to September 30, 1919, October 13 to December 19, 1919, and January 7 to April 20, 1920. Records fair.

Discharge measurements of San Saba River near San Saba, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft*	1919.		*Feet.*	*Sec.-ft.*
Oct. 10	Kinnison and Gowans.	4.03	646	Aug. 8	Dudley and Twichell...	2.08	120
11	A. K. Gowans.....	12.86	3,800	Nov. 4	D. A. Dudley.....	2.97	356
12	Kinnison and Gowans.	18.71	[a]6,250				
12	.....do.....	14.71	4,690	1920.			
12	.....do.....	12.42	3,540	Mar. 2	.....do.....	2.78	245
13	.....do.....	5.17	989	31	.....do.....	2.42	181
				Apr. 25	.....do.....	2.20	156
1919.				June 3	.....do.....	3.00	226
Jan. 13	Ellsworth and Congdon	1.89	96.4	July 12	.....do.....	1.98	112
May 21	J. E. Powers.....	2.75	202				

[a] Surface velocity observed over part of the section.

Daily discharge, in second-feet, of San Saba River near San Saba, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	16	71	116	136	223	124	130	59	94	532	186	202
2	15	70	107	132	223	124	124	52	96	365	175	184
3	17	60	101	126	212	122	122	53	108	329	168	170
4	17	58	98	120	198	122	124	53	107	294	159	161
5	16	54	94	114	191	120	114	1,060	96	257	150	152
6	21	48	91	108	200	120	108	301	86	228	141	147
7	21	347	92	108	184	116	105	218	78	221	136	143
8	22	5,140	91	105	175	122	99	430	74	233	128	141
9	21	11,300	91	101	163	130	136	132	266	311	126	136
10	276	1,760	91	98	156	134	101	108	4,010	329	126	128
11	3,370	594	88	98	154	128	92	512	2,960	257	124	126
12	6,060	365	88	98	150	124	89	864	547	223	122	122
13	834	264	88	96	150	124	89	1,010	316	186	116	118
14	438	99	88	99	145	120	89	249	274	175	110	116
15	214	252	88	112	141	124	84	900	177	163	105	342
16	156	191	84	159	136	128	83	2,270	259	145	103	1,630
17	112	145	86	228	150	130	77	1,530	2,090	141	99	684
18	86	124	99	269	177	124	77	609	489	141	172	304
19	72	112	249	247	186	110	77	424	951	126	588	247
20	67	107	666	242	182	107	77	1,160	1,100	4,430	205	1,860
21	58	103	449	212	184	101	72	344	696	5,490	2,950	242
22	708	99	200	2,510	156	94	67	212	1,240	1,440	909	7,730
23	1,670	103	4,830	547	150	94	62	166	3,860	588	1,030	9,160
24	567	99	741	329	139	112	59	147	1,340	403	684	5,830
25	214	99	342	264	134	2,000	57	182	2,610	319	435	2,160
26	143	128	233	223	128	373	57	170	3,150	269	744	1,330
27	573	230	193	822	128	209	58	206	3,980	240	684	868
28	230	159	170	576	126	166	59	163	3,830	223	550	708
29	152	147	156	337	.....	147	63	130	2,320	214	324	588
30	92	122	147	276	.....	296	71	108	696	205	254	558
31	78	.....	145	242	.....	168	.....	101	.....	195	214	.....

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Daily discharge, in second-feet, of San Saba River near San Saba, Tex., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	470	426	560	268	356	244	184	127	131	102	94	117
2	384	398	500	268	356	244	178	136	148	91	84	129
3	356	384	500	268	356	244	174	131	370	88	188	131
4	343	356	456	268	343	233	168	131	226	91	224	141
5	317	343	456	398	343	222	174	131	215	85	172	134
6	330	343	456	745	343	222	170	134	163	79	124	134
7	441	356	456	560	343	222	176	620	154	75	370	1,270
8	651	3,700	441	441	343	222	178	905	143	70	168	141
9	777	1,720	398	412	330	222	174	196	136	145	122	127
10	530	1,400	370	356	330	222	174	233	129	163	104	112
11	1,400	841	370	1,000	330	222	172	308	126	122	94	104
12	560	713	370	2,310	426	222	165	244	120	114	89	101
13	456	590	356	1,200	370	222	165	188	163	129	87	96
14	384	590	356	809	330	222	166	178	141	104	95	95
15	356	590	343	651	317	211	170	184	120	91	938	92
16	356	590	330	620	328	211	168	412	120	88	1,000	91
17	3,380	560	330	590	338	203	165	268	120	91	1,540	91
18	938	500	330	560	348	203	161	194	116	84	560	91
19	713	470	370	530	358	203	152	166	198	85	292	99
20	560	470	370	500	268	198	150	152	163	182	268	92
21	470	456	343	470	268	205	148	150	131	132	200	92
22	777	456	330	470	268	205	145	145	117	95	159	89
23	2,620	426	317	441	268	205	148	139	120	95	141	84
24	1,140	426	317	441	268	205	147	141	116	95	188	83
25	620	426	304	441	268	233	154	139	114	89	161	81
26	560	412	292	441	256	233	154	138	111	83	682	83
27	560	398	292	412	256	213	141	138	108	79	317	81
28	485	651	292	412	244	196	138	138	108	84	218	85
29	456	682	279	398	244	190	129	134	111	168	170	88
30	441	620	279	370	.....	184	131	131	110	124	139	85
31	456	.....	268	370	.....	182	.....	134	.....	124	120	.....

NOTE.—Discharge, Nov. 9, 1918, Sept. 22 and 23, 1919, determined from extension of rating curve and is subject to considerable error. Discharge, Feb. 16-19, 1920, interpolated.

Monthly discharge of San Saba River near San Saba, Tex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	6,060	15	526	32,400
November	11,300	48	748	44,500
December	4,830	84	329	20,200
January	2,510	96	294	18,100
February	223	126	166	9,220
March	2,000	94	200	12,300
April	136	57	87	5,189
May	2,270	52	449	27,600
June	4,010	74	1,260	75,060
July	5,490	126	602	37,000
August	2,950	99	387	23,800
September	9,160	116	1,210	72,000
The year	11,300	15	521	377,000
1919-20.				
October	3,380	317	719	44,200
November	3,700	343	676	40,200
December	560	268	369	22,700
January	2,310	268	562	34,600
February	426	244	317	18,200
March	244	182	215	13,200
April	184	129	161	9,580
May	905	127	215	13,200
June	370	108	145	8,630
July	182	70	105	6,460
August	1,540	84	294	18,100
September	1,270	81	141	8,390
The year	3,700	70	327	237,000

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NORTH LLANO RIVER NEAR JUNCTION, TEX.

LOCATION.—About 500 feet above remains of old Wilson dam, 1 mile below mouth of Bear Creek, 2½ miles above North Llano highway bridge, 3 miles northwest of Junction, Kimble County, and 4 miles above confluence of North Llano and South Llano rivers.

DRAINAGE AREA.—803 square miles (measured on standard topographic maps; post-route map; and topographic map of Texas, compiled in 1899 by Robert T. Hill, of the United States Geological Survey; scale, 1 inch=25 miles).

RECORDS AVAILABLE.—September 14, 1915, to September 30, 1920.

GAGE.—Overhanging chain gage on left bank; read by J. L. Sparkman, A. T. Copple, and W. M. Keen.

DISCHARGE MEASUREMENTS.—Made by wading or from highway bridge 2½ miles below station.

CHANNEL AND CONTROL.—Bed composed of solid rock. Channel straight above and below for 400 feet, with a series of pools and rapids. Left bank high, clean, and not subject to overflow; right bank low, wooded, and subject to overflow during high stages. One channel at all stages; current sluggish at gage during low and medium stages. A solid rock ledge of approximately 2 feet vertical fall at site of old dam serves as a permanent control for medium and low stages, except slight effect from accumulation of moss during low stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 10.8 feet at 6 a. m. September 22 (discharge not determined); minimum stage, 0.82 foot October 8, 1918 (discharge, 0.3 second-foot).

Maximum stage recorded during year ending September 30, 1920, 4.4 feet at 9 a. m. May 13 (discharge not determined); minimum stage, 1.26 feet July 23–29 and August 3 to 6 (discharge, 12 second-feet).

1915–1920: Maximum stage recorded, 18.00 feet during night of September 15, 1915 (discharge not determined); no flow during periods in 1917 and 1918.

ICE.—None.

DIVERSIONS.—Records of the Board of Water Engineers for the State of Texas show that about 1,200 acres have been declared irrigated by diversion above the station. During low stages, such diversions materially reduce flow at station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent for low and medium stages, except as slightly affected by aquatic growth on control. Rating curves used November 8, 1918, to September 30, 1919, and October 1, 1919, to September 30, 1920, fairly well defined between 1 and 120 second-feet; extended above. Gage read to hundredths twice daily and oftener during floods. Daily discharge determined by applying mean daily gage height to rating table; indirect method used October 1 to November 7, 1918. Records good for low and medium stages.

Discharge measurements of North Llano River near Junction, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Ft.*	*Sec.-ft.*	1919.		*Ft.*	*Sec.-ft.*
Oct. 4	Kinnison and Gowans.	0.94	[a] 0.5	Nov. 19	D. A. Dudley	1.69	94.6
1919.				1920.			
Jan. 8	Ellsworth and Congdon	1.35	21.4	Jan. 20	do	1.62	70.8
8	do	1.35	21.0	Mar. 5	do	1.55	49.1
May 19	J. E. Powers	1.70	108	June 1	do	1.43	33.4
July 25	Dudley and Twichell	1.54	46.7				

[a] Estimated.

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Daily discharge, in second-feet, of North Llano River near Junction, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	1.2	8.4	19	21	33	21	30	49	33	153	29	77
2	1.0	7.2	19	21	33	21	34	36	49	127	29	67
3	.9	7.2	19	21	30	21	37	30	31	130	27	67
4	.9	7.2	19	23	34	21	33	30	30	100	26	64
5	.9	8.4	19	23	36	21	33	36	30	97	24	55
6	.7	9.6	19	23	30	21	30	30	30	86	24	.....
7	.4	9.6	18	23	30	21	27	25	30	97	22	.....
8	.3	.....	18	21	30	21	25	25	30	103	20	.....
9	.9	.....	18	21	30	21	33	26	44	80	20	.....
10	7.2	93	18	21	30	21	29	30	64	70	20	.....
11	6.6	83	18	21	30	21	23	117	58	58	20	.....
12	6.0	70	16	21	30	21	23	124	55	55	20	.....
13	36	64	16	21	30	21	23	39	49	52	20	.....
14	14	58	16	22	30	21	21	39	39	44	20	.....
15	1.6	47	16	22	30	21	21	39	39	44	20	.....
16	1.6	39	16	21	30	21	21	39	49	42	20	.....
17	1.6	36	16	21	34	21	21	39	58	39	18	131
18	1.6	36	16	21	30	21	21	93	36	36	17	100
19	1.5	33	16	21	27	21	21	93	42	36	17	86
20	1.5	31	21	21	33	21	21	93	97	47	17	86
21	11	30	23	16	29	21	21	93	117	67	.....	103
22	70	27	23	117	25	21	19	80	77	47	.....	.....
23	20	30	34	93	21	21	19	67	55	44	.....	.....
24	18	23	30	39	21	49	18	97	.....	52	.....	.....
25	29	23	25	25	21	110	17	61	.....	49	172	.....
26	21	23	24	25	21	86	17	61	.....	44	134	.....
27	19	23	23	42	21	58	17	49	.....	37	127	.....
28	17	23	23	44	21	31	17	34	.....	34	153	.....
29	15	21	21	39	.....	30	17	33	216	31	114	.....
30	12	21	21	33	.....	30	168	30	180	29	107	.....
31	8.4	.....	21	34	.....	30	.....	39	.....	29	86	.....
1919-20.												
1	.....	132	75	49	59	49	38	32	32	20	16	38
2	.....	129	75	49	59	59	38	32	26	18	16	158
3	.....	122	75	49	59	59	38	32	26	16	12	68
4	.....	114	75	49	59	59	38	32	26	18	12	59
5	.....	114	78	78	59	54	38	29	26	20	12	54
6	.....	114	71	68	59	54	39	29	26	18	75	49
7	.....	140	64	54	59	49	41	26	26	16	33	45
8	.....	147	61	51	59	49	41	26	24	22	22	38
9	.....	122	61	49	59	49	41	26	24	25	22	38
10	.....	114	61	49	59	49	41	24	24	26	18	38
11	.....	107	61	78	59	49	41	26	22	26	18	38
12	.....	100	61	78	59	49	41	26	22	23	18	35
13	208	93	61	59	59	49	41	.....	22	22	16	35
14	196	93	61	59	59	49	38	.....	22	20	.....	32
15	196	93	61	59	59	45	38	68	22	18	.....	32
16	196	93	61	59	59	45	38	61	22	18	.....	29
17	188	93	61	59	59	41	35	49	22	18	.....	28
18	173	93	61	59	59	41	35	41	22	18	129	26
19	173	100	56	59	56	41	35	41	22	16	100	26
20	165	100	56	61	54	41	35	41	22	16	71	26
21	162	93	51	59	54	41	35	41	45	15	64	26
22	.....	89	51	75	54	41	35	41	35	14	59	26
23	196	86	51	78	49	41	33	41	26	12	154	26
24	177	86	51	71	49	38	32	38	25	12	75	24
25	158	82	51	71	49	54	32	35	24	12	61	24
26	158	78	51	71	49	47	32	32	22	12	56	24
27	150	78	51	71	49	41	32	29	22	12	51	23
28	147	96	51	71	49	41	32	29	22	12	38	22
29	143	86	51	71	49	38	32	26	22	12	38	.....
30	143	78	51	71	.....	38	32	26	22	16	38	111
31	143	.....	51	71	.....	38	.....	26	.....	16	38	.....

NOTE.—No record Sept. 6-15, 1919. Discharge for following days not determined, because stage was above the limit for which rating curve was defined by discharge measurements:

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Day.	Gage height.	Day.	Gage height.	Day.	Gage height.	Day.	Gage height.	Day.	Gage height.
1918.	*Feet.*	1919.	*Feet.*	1919.	*Feet.*	1919.	*Feet.*	1920.	*Feet.*
Nov. 8	4.06	Aug. 21	5.54	Sept. 26	2.77	Oct. 5	2.07	May 13	2.90
9	2.91	22	4.04	27	2.63	6	2.28	14	2.14
		23	2.46	28	2.49	7	2.14	Aug. 14	2.91
1919.		24	2.00	29	2.40	8	2.33	15	2.80
June 24	2.36	Sept. 16	2.31	30	2.32	9	2.14	16	2.70
25	3.02	22	6.39	Oct. 1	2.24	10	2.06	17	2.09
26	3.13	23	6.56	2	2.17	11	2.02	Sept. 20	2.52
27	2.84	24	6.83	3	2.12	12	2.01		
28	2.46	25	3.39	4	2.10	23	2.72		

Monthly discharge of North Llano River near Junction, Tex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	36	0.3	10.5	646
November	.....	7.2	.....	.....
December	34	16	20.0	1,230
January	117	21	30.2	1,860
February	36	21	28.6	1,590
March	110	21	29.3	1,800
April	168	17	28.6	1,700
May	124	25	54.1	3,330
June	.....	30	.....	.....
July	153	29	62.9	3,870
August	.....	17	.....	.....
1919–20.				
November	147	78	102	6,070
December	78	51	59.9	3,680
January	78	49	63.1	3,880
February	59	49	56.0	3,220
March	59	38	46.4	2,850
April	41	32	36.6	2,180
June	45	22	24.8	1,480
July	26	12	17.4	1,070

NOTE.—See footnote to daily-discharge table.

LLANO RIVER NEAR JUNCTION, TEX.

LOCATION.—About 100 feet north of Kerrville-Junction road, a quarter of a mile northeast of Oliver ranch house, 3 miles below confluence of North Llano and South Llano rivers, 3½ miles east of Junction, Kimble County, and 4 miles above creek entering river from south.

DRAINAGE AREA.—1,700 square miles (measured on standard topographic maps; post-route map; and topographic map of Texas, compiled in 1899 by Robert T. Hill, of the United States Geological Survey; scale, 1 inch=25 miles).

RECORDS AVAILABLE.—September 13, 1915, to September 30, 1920.

GAGE.—Vertical staff, graduated from 0 to 7.5 feet, attached to tree on right bank, and inclined staff, graduated from 7.6 to 19.5 feet, a few feet upstream from vertical staff; read by Sadie Oliver.

DISCHARGE MEASUREMENTS.—Made by wading at Mason road crossing a quarter of a mile above gage or from cable 400 feet above gage.

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CHANNEL AND CONTROL.—Bed composed of solid rock, clean, and permanent. Channel straight for 700 feet above and 350 feet below the gage. Left bank of medium height, slightly wooded, and subject to overflow during high water; right bank clean, high, and not subject to overflow. One channel at all stages except during extreme floods, when a small part of the flow may follow a slough that leaves the river a short distance above the gage, passes to the south of Oliver ranch house, and enters the main stream below the gage. Such conditions do not occur, however, at intervals more frequent than 10 to 15 years and will not greatly affect records. Rock ledge 75 feet below gage, forming a fall of approximately 3 feet, serves as permanent control for low and medium stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 15.0 feet at 11 a. m. September 27 (discharge not determined); minimum stage, 1.42 feet during October 6 and 7 (discharge, 35 second-feet).

Maximum stage recorded during year ending September 30, 1920, 10.0 feet at 9 a. m. May 14 (discharge not determined); minimum stage, 1.68 feet during July 28 to August 12 (discharge, 109 second-feet).

1915-1920: Maximum stage recorded, 26.3 feet at 3 a. m. September 16, 1915 (discharge not determined); minimum stage, 1.32 feet during August 23-28, 1918 (discharge, 13 second-feet).

ICE.—None reported.

DIVERSIONS.—Records of the Board of Water Engineers for the State of Texas show that about 2,500 acres have been declared irrigated by diversions above station and about 1,300 below station. Diversions materially reduce flow at station during low stages.

REGULATION.—Slight regulation from water-power plant on South Llano River at Junction, Tex.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined between 24 and 250 second-feet. Gage read to hundredths once daily, oftener during high water, but one reading daily may not be true mean owing to slight regulation by power plant at Junction. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent for low and medium stages; determination of discharge above 400 second-feet may be considerably in error.

Discharge measurements of Llano River near Junction, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 4	Kinnison and Gowans..	1.42	30.6	Nov. 18	D. A. Dudley.....	1.99	253
1919.				1920.			
Jan. 8	Ellsworth and Congdon	1.60	78.8	Jan. 21	.....do.....	1.86	197
8	.....do.....	1.60	77.9	Mar. 4	.....do.....	1.80	153
May 19	J. E. Powers.....	1.92	222	June 2	.....do.....	1.74	130
July 24	Dudley and Twichell...	1.74	151				

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Daily discharge, in second-feet, of Llano River near Junction, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	39	69	94	84	116	84	77	102	94	165	94	306
2	39	69	94	84	116	84	91	58	87	112	94	306
3	39	69	94	84	116	84	91	58	116	112	87	306
4	39	63	94	77	116	84	91	58	116	112	87	306
5	37	63	94	77	116	84	77	48	87	112	87	306
6	35	63	94	77	116	84	112	48	87	112	87	306
7	35	63	94	77	116	84	112	48	87	156	89	306
8	39	.....	87	77	116	84	98	48	80	120	80	306
9	39	.....	87	77	109	80	98	102	80	112	74	260
10	39	.....	87	77	109	74	98	170	218	112	74	260
11	39	.....	87	72	102	74	77	.....	160	112	63	208
12	39	.....	87	72	102	74	77	.....	160	112	52	208
13	39	208	87	72	102	74	77	.....	116	105	52	208
14	39	208	87	72	102	74	66	213	116	102	52	208
15	74	208	87	72	102	74	66	213	116	91	48	208
16	74	208	87	72	98	74	66	213	87	91	44	208
17	74	160	102	72	98	74	66	213	87	91	44	208
18	74	160	102	72	98	74	60	198	87	91	39	208
19	69	142	102	72	98	74	60	198	87	91	39	208
20	69	142	102	72	98	74	58	198	87	134	39	208
21	69	142	94	434	98	74	48	198	87	134	.....	318
22	69	142	94	250	91	74	48	198	84	160	.....	.....
23	69	142	94	189	91	74	48	198	84	160	.....	.....
24	69	116	94	116	91	229	48	198	203	142	.....	.....
25	69	116	94	116	84	109	48	198	213	142	.....	.....
26	69	109	94	116	84	94	48	198	.....	109	.....	.....
27	69	109	94	116	84	94	48	198	.....	109	440	378
28	69	94	94	239	84	80	48	198	.....	102	403	378
29	69	94	94	189	.....	80	44	165	213	102	366	378
30	69	94	94	151	.....	77	44	147	203	94	306	378
31	69	.....	94	116	.....	77	.....	98	.....	94	306	.....
1919–20.												
1	378	428	239	189	198	179	179	134	151	116	109	160
2	318	403	239	189	198	179	179	125	134	118	109	403
3	318	403	239	179	198	179	179	125	125	120	109	198
4	318	403	239	179	198	160	179	125	125	125	109	198
5	318	403	239	179	198	179	179	125	142	125	109	160
6	318	390	239	179	198	179	179	125	142	125	109	160
7	306	390	239	179	198	179	179	125	142	125	109	142
8	306	390	239	179	189	179	179	125	134	125	109	142
9	318	390	229	179	189	179	179	198	125	125	109	134
10	318	318	229	179	189	179	179	179	125	125	109	134
11	318	330	229	198	189	179	170	179	125	125	109	134
12	318	330	229	198	189	179	170	179	125	125	109	116
13	312	318	229	198	189	179	160	170	116	125	116	116
14	312	295	229	198	189	179	151	.....	116	125	.....	116
15	306	272	218	198	189	179	151	.....	116	125	208	116
16	306	272	218	198	189	179	151	198	116	125	198	116
17	306	260	218	198	189	184	142	198	116	125	160	116
18	306	260	218	198	189	179	142	189	116	116	160	116
19	306	260	218	198	189	179	142	189	260	116	160	116
20	306	260	218	198	189	179	142	189	160	116	184	116
21	306	260	208	193	189	179	142	189	142	116	170	116
22	.....	260	208	198	179	179	142	189	134	116	170	116
23	506	250	198	198	179	229	134	189	116	116	170	116
24	492	250	198	198	179	198	134	179	116	116	170	116
25	466	250	198	198	179	189	134	179	116	112	160	116
26	440	250	189	189	179	189	134	179	116	112	160	116
27	440	239	189	189	179	189	134	179	116	112	160	116
28	440	239	189	198	179	179	134	179	116	109	160	116
29	428	239	189	198	179	179	134	179	116	109	160	.....
30	428	239	189	198	.....	179	134	179	116	109	160	575
31	428	.....	189	198	.....	179	.....	160	.....	109	160	.....

NOTE.—Discharge, July 1–3, 1920, interpolated. Rating curve not sufficiently well defined to permit ination of discharge for following days:

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Day.	Gage height.	Day.	Gage height.	Day.	Gage height.	Day.	Gage height.	Day.	Gage height.
1918.	*Feet.*	1919.	*Feet.*	1919.	*Feet.*	1919.	*Feet.*	1920.	*Feet.*
Nov. 8	3.00	May 11	3.80	Aug. 21	7.78	Sept. 22	14.00	May 14	10.00
9	2.90	12	8.62	22	8.00	23	15.00	15	2.90
10	2.70	13	2.83	23	4.90	24	13.20	Aug. 14	2.93
11	2.70	June 26	3.91	24	3.88	25	3.60	Sept. 29	2.90
12	2.70	27	5.52	25	2.80	26	3.20		
		28	3.01	26	2.68	Oct. 22	2.70		

Monthly discharge of Llano River near Junction, Tex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	74	35	55.8	3,430
November	.....	63	.....	.....
December	102	87	93.0	5,720
January	434	72	114	7,010
February	116	84	102	5,660
March	229	74	84.8	5,210
April	112	44	69.7	4,150
May	.....	48	.....	.....
June	.....	80	.....	.....
July	165	91	116	7,130
August	.....	39	.....	.....
September	.....	208	.....	.....
1919-20.				
November	428	239	308	18,300
December	239	189	217	13,300
January	198	179	192	11,800
February	198	179	188	10,800
March	229	160	182	11,200
April	179	134	156	9,280
June	260	116	130	7,740
July	125	109	119	7,320

NOTE.—See footnote to table of daily discharge.

BARTON SPRINGS AT AUSTIN, TEX.

LOCATION.—Barton Springs issue from channel of Barton Creek, 1,600 feet above Bee Cave highway bridge, half a mile above confluence of Barton Creek and Colorado River, and half a mile southwest of Austin, Travis County.

RECORDS AVAILABLE.—October 1, 1918, to September 30, 1920. Daily records of flow of Barton Creek, which closely approximate flow of Barton Springs, as the ordinary flow of the creek is from the springs, have been published from April 25, 1917, to September 30, 1918. Miscellaneous discharge measurements of Barton Creek were made from 1894 to 1906, and during 1916 and 1917.

DISCHARGE MEASUREMENTS.—Made by wading Barton Creek above and below the springs, in order to determine the flow of springs as indicated in the following table:

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Discharge measurements of Barton Creek and determination of discharge of Barton Springs at Austin, Tex., during years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Discharge of creek below springs.	Discharge of creek above springs	Discharge of springs.	Date.	Made by—	Discharge of creek below springs.	Discharge of creek above springs.	Discharge of springs.
1918.					1919.				
Oct. 18	H. B. Kinnison	14.1	0	14.1	Oct. 25	L. D. Snow	399	270	129
Nov. 18	do	17.6	0	17.6	Nov. 5	do	198	97	101
Dec. 2	A. K. Gowans	16.5	0	16.5	15	do	162	57.5	104
14	Ellsworth and Gowans	15.2	0	15.2	26	do	122	29.6	92.4
					Dec. 20	T. Twichell	102	23.9	78.1
1919.					1920.				
Jan. 10	Kinnison and Hank	26.7			Jan. 3	do	82.0	11.0	71.0
Feb. 11	A. K. Gowans	87.8			17	do	275	136	139
27	Hank and Gowans	116	60.0	56.0	31	Twichell and Pritchett	249	159	90
Mar. 14	R. J. Hank	75.0	20.2	54.8	Feb. 21	T. Twichell	141	46.8	94.2
Apr. 10	do	105	35.7	69.3	Mar. 2	do	116	29.1	86.9
May 6	do	1,450			20	do	81.3	10.0	71.3
21	Ellsworth and Hank	249	160	89	Apr. 13	do	72.3	.4	71.9
July 15	Ellsworth and Dudley	95.0	34.0	61.0	24	do	64.0	.3	63.7
Aug. 12	T. Twichell	132	79.0	53.0	May 8	do	56.0	0	56.0
12	do			a 7.7	22	do	164	63.4	101
Sept. 11	do	63.7	6.9	56.8	June 7	do	133	41.3	91.7
29	D. A. Dudley	187	103	84	22	do	69.8	b .5	69.3
Oct. 8	do	228	158	70	July 7	do	69.8	b .5	69.3
					21	do	58.6	0	58.6
					Aug. 24	do	121	44.5	76.5
					Sept. 20	do	61.4	b .5	60.9

a Measurement made at spillway of concrete oval of one spring.
b Estimated.

GUADALUPE RIVER BASIN.

GUADALUPE RIVER NEAR COMFORT, TEX.

LOCATION.—On Comfort-Kerrville road 100 feet upstream from "Boerner crossing," 3½ miles west of Comfort, Kerr County.

DRAINAGE AREA.—909 square miles (measured on topographic map of Texas, compiled in 1899 by Robert T. Hill, of the United States Geological Survey; scale, 1 inch=25 miles).

RECORDS AVAILABLE.—December 16, 1917, to September 30, 1920.

GAGE.—Vertical staff in two sections on left bank; read by James B. Saylor and Robert Faust.

DISCHARGE MEASUREMENTS.—Low-water measurements made by wading. No high-water section available.

CHANNEL AND CONTROL.—Bed composed of rock, sand, and gravel. Left bank composed of clay, slightly wooded, and not subject to overflow. Right bank low, wooded, and subject to overflow. Control shifts during floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, about 41 feet on August 21, determined from flood marks near gage (discharge not determined); minimum stage, 1.06 feet at 2.13 p. m. October 8 (discharge, 6 second-feet).

Maximum stage during year ending September 30, 1920, occurred on October 16 (not recorded); minimum stage, 1.68 feet at 8.50 a. m. September 28 (discharge, 58 second-feet).

1917–1920: Maximum stage recorded about 41 feet on August 21, 1919, determined from flood marks near gage (discharge not determined); minimum stage, 1.06 feet at 2.13 p. m. October 8, 1918 (discharge, 6.0 second-feet).

ICE.—None reported.

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DIVERSIONS.—Few pumping plants along stream about 7 miles above station. Records of the Board of Water Engineers for State of Texas show that a total of about 400 acres have been declared irrigated by diversion above the station.

REGULATION.—At Kerrville and Center Point dams are constructed and water used for mill purposes, but the effect of the regulation is slight, except during low stages.

ACCURACY.—Stage-discharge relation changes during floods. Rating curve fairly well defined below 400 second-feet and extended above. Gage read to hundredths once daily, except as shown in footnote to daily-discharge table. One reading a day may not be true index to discharge at low stages owing to storage and intermittent pumping above gage and to rapid fluctuations during flood stages. Daily discharge determined by applying mean daily gage height to rating table; indirect method used October 6, 1918, to September 30, 1919. Discharge above 400 second-feet determined from extension of rating curve and subject to considerable error. Records fair.

Discharge measurements of Guadalupe River near Comfort, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 22	McCashin and Congdon.	2.55	211	Feb. 2	Ellsworth and Congdon.	2.12	146
Nov. 30	E. P. Congdon.....	1.68	56.9	Dec. 17	C. E. Ellsworth.....	2.96	361
				1920.			
				Sept. 8	McCashin and West...	1.99	114

Daily discharge, in second-feet, of Guadalupe River near Comfort, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	12	21	55	147	132	72	172	93	82	187	150	466
2	12	21	50	147	136	72	201	83	74	159	132	402
3	11	22	48	145	132	72	177	76	84	150	122	372
4	15	23	45	145	226	72	168	74	81	141	112	366
5	11	23	44	145	126	93	132	73	72	128	104	366
6	12	24	43	116	126	76	124	73	68	120	104	357
7	13	.....	43	83	112	61	112	73	67	810	104	350
8	6	.....	43	70	112	70	102	73	78	920	93	342
9	16	663	42	67	110	67	282	76	88	532	86	342
10	12	.....	42	66	108	67	104	145	466	434	90	312
11	42	.....	41	64	108	70	102	306	112	253	93	294
12	18	.....	40	60	108	70	102	466	88	226	93	282
13	65	.....	100	60	93	70	108	434	84	190	90	253
14	43	.....	65	61	90	73	101	226	76	154	90	.....
15	27	.....	64	64	84	70	93	177	74	154	90	.....
16	26	.....	61	154	93	70	90	670	73	154	90	.....
17	25	.....	199	112	102	64	83	312	73	132	86	.....
18	16	.....	197	112	108	61	76	233	90	120	83	.....
19	19	.....	176	112	102	58	76	154	154	112	61	.....
20	19	.....	169	112	93	56	73	145	132	110	61	.....
21	19	.....	136	108	90	56	70	124	108	466	.....	.....
22	223	.....	813	.....	84	58	67	112	108	635	.....	.....
23	88	.....	.....	.....	76	60	70	154	108	434	.....	.....
24	57	.....	880	.....	81	61	73	154	88	466	.....	.....
25	43	.....	402	.....	81	1,100	73	143	90	282	.....	.....
26	38	.....	201	.....	76	726	73	132	652	372	.....	.....
27	33	.....	177	201	73	466	73	101	880	286	.....	.....
28	28	.....	154	182	73	282	73	90	670	201	.....	.....
29	30	.....	150	154	.....	226	154	83	312	177	.....	635
30	27	59	147	132	.....	214	132	83	226	168	532	635
31	23	.....	147	132	.....	201	.....	90	.....	154	499	.....

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Daily discharge, in second-feet, of Guadalupe River near Comfort, Tex., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	775	.....	775	342	372	297	372	172	177	168	108	112
2	775	.....	775	327	372	282	342	170	253	159	108	93
3	775	.....	740	327	372	282	282	168	226	154	101	61
4	775	.....	740	396	372	282	268	168	201	148	101	112
5	775	.....	740	466	372	282	253	163	196	143	93	109
6	775	.....	740	372	372	282	248	154	.....	132	104	107
7	775	880	740	372	357	282	242	154	.....	130	.....	104
8	.....	880	740	357	357	282	242	150	670	130	740	110
9	.....	862	740	357	357	282	226	150	282	130	670	104
10	.....	845	740	357	357	282	216	150	253	130	282	104
11	.....	845	740	514	357	282	211	150	201	121	201	104
12	.....	845	740	670	357	282	206	150	191	112	177	100
13	.....	845	740	670	357	282	206	150	189	104	154	97
14	880	845	556	670	357	275	201	.....	187	101	810	97
15	880	845	372	466	350	268	201	845	187	93	.....	93
16	.....	845	372	466	342	268	196	656	177	101	253	93
17	.....	845	372	466	342	268	196	466	177	101	201	93
18	.....	845	357	419	327	253	189	253	177	102	177	91
19	.....	775	357	372	327	253	182	242	201	104	172	88
20	.....	775	357	357	312	248	177	226	201	101	154	86
21	.....	740	357	372	312	248	177	201	201	97	147	83
22	.....	740	357	372	312	248	177	201	187	93	142	76
23	.....	740	357	466	312	242	172	198	177	90	136	70
24	.....	740	357	740	312	242	172	196	177	90	141	67
25	.....	740	342	556	312	466	172	191	206	90	145	67
26	.....	740	342	372	312	372	172	191	201	90	150	64
27	.....	740	342	357	297	253	172	187	194	90	141	61
28	880	740	342	357	297	250	172	177	187	90	136	58
29	845	810	342	357	297	248	172	177	177	108	134	112
30	845	792	342	372	.....	248	172	177	177	112	132	76
31	845	.....	342	372	.....	248	.....	177	.....	108	124	.....

NOTE.—Discharge interpolated or estimated for following days: Oct. 6, 20, and 27, 1918; Feb. 16, Mar. 2, 23, 30, Apr. 20, 27, May 4, 11, 18, 25, June 1, 8, 15, 22, July 6, 13, 20, 27, Aug. 3, 10, 17, 31, Sept. 7, Oct. 5, Nov. 9, 16, 23, 30, Dec. 7, 14, 21, and 28, 1919; Jan. 4, 11, 18, 25, Feb. 1, 15, 22, 23, 29, Mar. 7, 14, 21, 28, Apr. 4, 11, 18, 25, May 2, 9, 16, 23, 30, June 13, 20, 27, July 4, 11, 18, 25, Aug. 1, 22, 29, Sept. 5, 6, 12, 18, 19, and 26, 1920. Rating curve not defined for high stages to permit determination of discharge for following days:

Day.	Gage height.	Day.	Gage height.	Day.	Gage height.	Day.	Gage height.	Day.	Gage height.
1918.	*Feet.*	1919.	*Feet.*	1919.	*Feet.*	1919.	*Feet.*	1919.	*Feet.*
Nov. 7	13.5	Sept. 14	9.0	Sept. 25	6.5	Oct. 18	8.9	Nov. 3	5.2
8	5.35	15	11.75	26	5.9	20	7.0	4	5.2
Dec. 23	14.3	16	11.3	27	5.3	21	6.5	5	5.0
		17	5.7	Oct. 8	9.2	22	9.8	6	4.8
1919.		18	5.5	9	6.2	23	7.9		
Jan. 22	7.03	19	5.5	10	5.1	24	6.1	1920.	
23	6.9	20	5.5	11	5.1	25	4.8	May 14	8.2
24	6.85	23	13.1	13	5.2	27	4.8	June 7	5.7
25	6.83	24	9.1	17	10.4	Nov. 1	5.8	Aug. 7	18.5
26	5.9								

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Monthly discharge of Guadalupe River near Comfort, Tex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	223	a 6	33.2	2,040
February	226	73	105	5,880
March	1,100	56	156	9,590
April	282	67	111	6,600
May	670	73	169	10,400
June	880	67	179	10,700
July	920	110	285	17,500
1919-20.				
November 7-30	880	740	804	38,300
December	775	342	524	32,200
January	740	327	433	26,600
February	372	297	340	19,600
March	466	242	277	17,000
April	372	172	213	12,700
July	168	90	114	7,010
September	112	61	89.7	5,340

a Minimum probably due to diversions above gage.

NOTE.—See footnote to daily-discharge table.

GUADALUPE RIVER AT NEW BRAUNFELS, TEX.

LOCATION.—At highway bridge on San Antonio-Austin post road, 700 feet below International & Great Northern Railway bridge, 1 mile below mouth of Comal River and 1 mile northeast of center of New Braunfels, Comal County.

DRAINAGE AREA.—1,760 square miles (measured on standard topographic maps; post-route map; and topographic map of Texas, compiled in 1899 by Robert T. Hill, of the United States Geological Survey; scale, 1 inch=25 miles).

RECORDS AVAILABLE.—March 13, 1898, to December 30, 1899; January 27, 1915, to September 30, 1920.

GAGE.—Stevens water-stage recorder, attached to downstream side of middle pier of highway bridge, inspected by engineers from Austin office. A vertical staff gage in three sections attached to trees on left bank 200 feet below highway bridge, and one section on east side of left pier of highway bridge was read from January 27, 1915, to September 28, 1917, when recorder was installed. Gage used from March 13, 1898, to December 30, 1899, was an inclined staff gage near the present highway bridge; relation between datum of inclined gage and that of the vertical staff gage not known. During normal flow, levels show 0.08 foot fall between intake of recorder and vertical staff gage location. Vertical staff gage in well of recorder set to read same as vertical staff downstream.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge.

CHANNEL AND CONTROL.—Bed composed of solid rock with pockets of coarse gravel; banks gravel, clay, and rock, slightly wooded, high, and not subject to overflow. Rock and gravel shoal just below gage serves as control; permanent except for slight aquatic growth during low stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 25.7 feet at 3 a. m. August 23 (discharge, 46,300 second-feet); minimum stage, 1.41 feet at 8 a. m. October 9 (discharge, 253 second-feet).

Maximum stage during year ending September 30, 1920, probably occurred during period, October 11-20, when water-stage recorder was not in operation; minimum stage, 1.99 feet at 4.20 p. m. September 8 (discharge, 476 second-feet).

1898-1899; 1915-1920: Maximum stage recorded, 27.2 feet at 9.30 p. m. September 17, 1915, determined by leveling from flood marks (discharge, 51,300 second-feet); minimum stage recorded, 1.23 feet at 6.20 p. m. May 30, 1918 (discharge, 188 second-feet).

ICE.—None.

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DIVERSIONS.—Some water diverted for irrigation above station in Kerr and Comal counties, and for water power, waterworks, and other municipal uses in Kerr, Kendall, and Comal counties; amount not known.

REGULATION.—Flow at this point slightly regulated by operation of power plants on Comal River.

ACCURACY.—Stage-discharge relation permanent except when affected by aquatic growth on control. Rating curve well defined between 250 and 40,000 second-feet. Operation of water-stage recorder satisfactory except as shown in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder chart by inspection, or by planimeter except as shown in footnote to daily-discharge table; shifting-control method used December 1, 1919, to May 13, 1920. Records excellent except during periods when discharge was estimated.

Discharge measurements of Guadalupe River at New Braunfels, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Nov. 9	H. B. Kinnison	4.08	1,810	Sept. 5	Dudley and Twichell	3.27	1,160
9	do	4.24	1,930	16	do	7.61	6,570
Dec. 2	Ellsworth and Kinnison	2.90	866	17	do	23.58	[b] 39,100
				17	do	20.73	[b] 31,400
1919.				17	do	14.26	[b] 15,100
Jan. 30	Ellsworth and Congdon	2.70	845	Oct. 23	L. D. Snow	6.84	[c] 4,980
Feb. 17	E. P. Congdon	2.34	657	Dec. 19	C. E. Ellsworth	3.66	1,370
Apr. 5	R. J. Hank	2.72	814				
24	C. E. Ellsworth	2.18	522	1920.			
May 29	J. E. Powers	2.38	663	Jan. 30	J. W. Pritchett	4.10	1,580
July 8	C. E. Ellsworth	7.85	[a] 6,200	Feb. 17	C. E. Ellsworth	3.72	1,300
8	do	7.75	[a] 6,100	Mar. 9	McCashin and Pritchett	3.40	1,120
8	do	6.54	[a] 4,580	May 7	D. A. Dudley	2.77	834
8	do	6.09	[a] 3,910	June 3	C. E. Ellsworth	3.00	981
9	do	5.32	3,180	28	T. Twichell	2.62	803
17	Ellsworth and Dudley	2.88	947	July 30	do	2.32	630
Aug. 20	T. T. Twichell	2.48	741	Sept. 7	McCashin and West	2.34	636
23	do	17.03	21,000				

[a] Surface velocity observed and coefficient of 0.95 used to reduce to mean velocity.
[b] Surface velocity observed and coefficients of 0.84 and 0.95 used to reduce to mean velocity.
[c] Surface velocity observed and coefficient of 0.90 used to reduce to mean velocity.

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Daily discharge, in second-feet, of Guadalupe River at New Braunfels, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	327	301	355	556	764	620		852	574	1,140	1,070	
2	308	294	355	525	737	610	900	680	574	916	1,010	
3	298	290	347	498	720	602		597	852	803	976	1,600
4	287	294	343	476	764	602		566	592	737	952	
5	284	290	339	466	748	620	825	548	556	685	910	
6	290	290	339	458	786	625	786	534	556	665	880	1,120
7	284	290	335	458	786	602	754	946	543	858	852	1,100
8	287	1,210	331	444	737	615	732	655	534	4,150	836	1,100
9	277	2,520	339	427	700	597	705	597	548	3,190	869	1,080
10	277	3,210	335	419	680	597	732	592	675	1,800	898	1,030
11	323	1,100	331	415	675	588	842	1,180	825	1,300	852	1,000
12	335	720	327	411	695	584	695	1,540	836	1,130	836	958
13	294	574	343	407	655	579	660	1,600	685	1,060	786	922
14	287	507	343	407	650	584	655	1,300	602	1,000	770	988
15	274	574	359	440	630	584	650	1,010	574	976	726	1,830
16	277	552	431	561	606	584	630	880	630	952	705	5,760
17	280	625	387	606	630	566	620	830	764	910	695	25,000
18	280	462	399	602	645	556	606	1,040	650	886	685	4,820
19	284	399	705	579	665	548	602	904	615	842	759	3,580
20	290	379	1,530	556	685	552	597	803	695	808	640	3,060
21	294	371	958	670	695	548	588	798	720	1,430	705	2,670
22	359	363	754	4,040	700	538	588	726	635	5,790	5,760	6,860
23	498	359	1,380	2,040	675	538	584	690	847	3,090	25,200	29,200
24	928	359	5,600	2,060	665	543	570	742	874	2,270	17,800	11,200
25	502	359	2,120	1,260	655	748	570	690	2,270	1,910	4,140	8,040
26	597	351	1,220	1,040	635	3,060	561	841	2,360	1,700	2,800	5,350
27	453	355	922	958	630	1,480	552	1,130	3,940	1,510	2,360	4,400
28	367	355	776	916	625	1,290	552	737	4,720	1,400	2,150	3,900
29	339	363	695	946	.....	976	864	660	2,500	1,260		3,560
30	319	379	645	830	.....	852	836	606	1,470	1,190	2,200	3,290
31	304	.....	597	792	.....	781	.....	584	.....	1,130		.....
1919-20.												
1	3,080	3,080	1,620	1,280	1,540	1,210	1,210	852	1,000	782	635	
2	2,860	4,020	1,670	1,280	1,540	1,180	1,360	852	940	764	620	
3	2,750	2,970	1,580	1,280	1,490	1,180	1,120	852	1,000	754	615	
4	2,750	2,860	1,580	1,240	1,490	1,180	1,060	825	940	737	606	670
5	2,590	2,750	1,540	1,320	1,490	1,150	1,030	825	1,030	732	602	
6	2,640	2,640	1,580	1,360	1,490	1,150	1,030	825	1,000	898	606	
7	3,920	2,590	1,540	1,440	1,440	1,150	1,030	852	1,060	792	680	645
8	4,620	2,490	1,540	1,360	1,440	1,120	1,030	940	1,280	737	4,140	615
9	3,420	2,490	1,490	1,320	1,440	1,120	1,030	880	1,540	710		620
10	3,540	2,590	1,480	1,280	1,440	1,120	1,000	852	1,180	695		615
11		2,540	1,460	1,280	1,440	1,120	1,030	825	1,060	685		606
12		2,340	1,450	1,670	1,440	1,120	1,000	825	1,030	680		606
13		2,290	1,440	2,040	1,440	1,090	970	825	1,030	670		597
14		2,190	1,420	1,900	1,400	1,090	940	2,960	940	660		592
15		2,190	1,410	1,800	1,360	1,090	940	5,470	940	655		588
16	10,000	2,140	1,400	1,760	1,320	1,090	970	3,510	910	650		588
17		2,090	1,390	1,720	1,320	1,090	970	1,940	880	645		584
18		2,040	1,370	1,620	1,320	1,090	940	1,540	852	640		584
19		1,990	1,360	1,580	1,320	1,060	910	1,360	880	635		579
20		1,900	1,400	1,580	1,280	1,060	910	1,210	852	625	750	570
21	5,250	1,850	1,360	1,540	1,280	1,060	910	1,150	880	615		570
22	4,620	1,850	1,400	1,490	1,280	1,060	880	1,090	880	610		570
23	5,000	1,800	1,360	1,800	1,280	1,090	880	1,060	910	610		570
24	4,380	1,800	1,320	1,850	1,240	1,090	880	1,030	880	606		561
25	3,900	1,760	1,320	1,760	1,240	1,150	880	1,000	852	602		561
26	3,780	1,760	1,320	1,760	1,210	1,150	880	970	825	588		556
27	3,540	1,760	1,280	1,670	1,210	1,180	852	1,000	798	588		552
28	3,420	1,720	1,280	1,620	1,210	1,120	852	970	798	588		556
29	3,190	1,760	1,280	1,580	1,210	1,090	825	940	852	588		538
30	3,420	1,760	1,280	1,580	.....	1,060	825	940	798	625		552
31	3,190	.....	1,280	1,580	.....	1,060	.....	1,030	.....	620		.....

NOTE.—Discharge estimated for following periods: Apr. 1-4, Aug. 29 to Sept. 5, Oct. 11-20, Dec. 10-18 1919, and Aug. 9 to Sept. 6, 1920; braced figures show mean discharge for periods indicated. Gage height partly estimated June 28 to July 6, July 10-16, Sept. 15 and 16, 1919, because of obstruction in intake pipe. Discharge partly estimated Oct. 10, 21, Dec. 9 and 19, 1919, and Aug. 8, 1920. Discharge, Oct. 7, 1919, and May 14-16, 1920, determined by averaging the hourly discharge.

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Monthly discharge of Guadalupe River at New Braunfels, Tex., for the years ending Sept. 30, 1919, and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	928	274	348	21,400
November	3,210	290	616	36,700
December	5,600	327	782	48,100
January	4,040	407	815	50,100
February	786	606	687	38,200
March	3,060	538	747	45,900
April	.....	552	699	41,600
May	1,600	534	834	51,300
June	4,720	534	1,110	66,000
July	5,790	665	1,530	94,100
August	25,200	640	2,720	167,000
September	29,200	922	4,660	277,000
The year	29,200	274	1,300	937,000
1919–20.				
October	.....	2,590	5,670	349,000
November	4,020	1,720	2,270	135,000
December	1,670	1,280	1,430	87,900
January	2,040	1,240	1,560	95,900
February	1,540	1,210	1,370	78,800
March	1,210	1,060	1,120	68,900
April	1,360	825	971	57,800
May	5,470	825	1,300	79,900
June	1,540	798	961	57,200
July	898	588	671	41,300
August	4,140	602	831	51,100
September	.....	538	600	35,700
The year	.....	538	1,570	1,140,000

GUADALUPE RIVER NEAR GONZALES, TEX.

LOCATION.—Just below Guadalupe highway bridge, 1 mile below power house of Gonzales Water Power Co., 1½ miles south of Gonzales, Gonzales, County, and 2½ miles below mouth of San Marcos River.

DRAINAGE AREA.—3,620 square miles (measured on standard topographic maps; post-route map; and topographic map of Texas, compiled in 1899 by Robert T. Hill, of the United States Geological Survey; scale, 1 inch=25 miles).

RECORDS AVAILABLE.—July 1, 1915, to September 30, 1920. The United States Weather Bureau has obtained records from a gage at the power house of Gonzales Water Power Co. since September 1, 1904.

GAGE.—Vertical staff in three sections on right bank just below bridge; read by Frank Wilson.

DISCHARGE MEASUREMENTS.—Made from cable, one-fourth mile below gage, or by wading. Measurements made from highway bridge, above stage of 22 feet when banks are overflowed at cable section.

CHANNEL AND CONTROL.—Bed composed of gravel and sand; channel below station straight for 500 feet, but above is broken by an island and is straight for not more than 50 feet. Banks composed of gravel and clay; medium height; wooded along water's edge on the right, and for some distance back on the left. Banks are overflowed at a stage of about 22 feet. At bridge, left bank protected by levee which is not overflowed, except during unusually high stages; right bank at bridge subject to overflow at stage of about 27 feet. Position of control not ı. At a stage of about 22 feet (discharge, 11,400 second-feet) water to enter an old channel, locally known as "Cross Timbers" on right bank s above gage and returns to main channel below gage. Consequently, all s of discharge greater than 11,400 second-feet do not represent the total f the stream, but only that in the main channel.

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EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 30.0 feet at 8.30 a. m. July 24 (discharge, 22,800 second-feet); minimum stage, 0.02 foot at 5.45 p. m. October 20 (discharge, 155 second-feet).

Maximum stage recorded during year ending September 30, 1920, 32.8 feet October 13, estimated by comparison with United States Weather Bureau gage at Gonzales dam (discharge, 30,400 second-feet): minimum stage, 2.06 feet at 7.40 a. m. September 26 (discharge, 698 second-feet).

1915–1920: Maximum stage occurred October 13, 1919 (see above); minimum stage occurred October 20, 1918 (see above).

ICE.—None.

DIVERSIONS.—Some water diverted above the station for irrigation and municipal uses, but the amount is small in comparison with the total run-off. As rainfall is nearly sufficient for general farming, irrigation is intermittent and it is extremely difficult to estimate the amount of water used.

REGULATION.—Flow at this point regulated somewhat by operation of water-power plants in the drainage above. Power house of Gonzales Water Power Co. is located 1 mile above station.

ACCURACY.—Stage-discharge relation not permanent. Rating curve fairly well defined between 300 and 28,000 second-feet. Gage read to hundredths twice daily. Mean of two readings daily may not be true mean for day, owing to power regulation above. Daily discharge determined by applying mean daily gage height to rating table, or by shifting-control method as noted in footnote to daily-discharge table. Records fair.

Discharge measurements of Guadalupe River near Gonzales, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Ft.*	*Sec.-ft.*	1919.		*Ft.*	*Sec.-ft.*
Oct. 31	McCashin and Congdon.	1.19	524	Oct. 19	D. A. Dudley	30.70	[b][d]27,600
Nov. 1	H. B. Kinnison	1.07	456	20	do	28.74	[c] 18,760
				20	do	27.67	[c] 18,170
1919.				21	do	24.95	[c] 14,140
Jan. 6	C. E. McCashin	1.90	845	23	do	20.42	[d] 9,100
23	do	19.13	[a] 9,530				
24	do	14.65	5,910	1920.			
25	do	6.55	2,710	Feb. 4	Ellsworth and Pritchett	6.36	2,550
Feb. 7	Ellsworth and Congdon	2.44	1,100	Mar. 15	McCashin and Pritchett	4.25	1,590
Mar. 12	A. K. Gowans	1.73	795	June 24	T. Twichell	6.28	2,270
May 30	J. E. Powers	2.47	1,040	July 28	Ellsworth and Twichell	2.58	883
July 18	Ellsworth and Dudley	5.06	1,850	Sept. 13	McCashin and West	2.41	832

[a] Surface velocity observed and coefficient of 0.96 used to reduce to mean velocity.
[b] Discharge in one channel measured; in three channels estimated.
[c] Water in two channels. Discharge measured in main channel only; flow in second channel not included. Surface velocity observed and coefficient of 0.93 used to reduce to mean.
[d] Surface velocity observed and coefficient of 0.93 used to reduce to mean.

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Daily discharge, in second-feet, of Guadalupe River near Gonzales, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	383	419	506	912	1,170	884	996	3,180	936	4,240	2,190	2,440
2	374	413	542	845	1,130	876	1,020	1,220	2,230	3,100	2,070	2,200
3	371	299	500	842	1,150	929	5,040	1,050	1,560	2,430	1,890	2,040
4	386	347	494	834	1,100	866	6,470	890	1,230	2,470	1,760	1,880
5	383	368	506	737	1,200	856	1,720	848	1,070	1,950	1,760	1,860
6	185	395	497	740	1,110	828	1,280	786	901	1,810	1,700	1,820
7	413	401	542	761	1,090	898	1,130	978	852	2,190	1,620	1,700
8	515	428	479	707	1,100	894	1,070	3,180	831	2,450	1,560	1,760
9	368	479	509	701	1,060	810	1,020	3,800	890	4,130	1,540	1,770
10	374	1,400	518	698	1,080	806	974	1,380	2,240	5,420	1,770	1,680
11	374	2,450	527	695	1,010	786	960	1,590	4,100	3,200	2,770	1,670
12	542	1,660	518	689	988	758	971	4,090	2,240	2,350	1,680	1,520
13	395	1,030	1,560	668	982	758	982	6,650	1,200	2,010	1,510	1,530
14	404	782	810	674	954	750	915	3,100	1,090	1,870	1,450	1,480
15	380	828	1,490	680	932	754	880	1,670	1,930	1,720	1,400	2,440
16	392	940	698	786	904	754	898	1,480	4,920	1,620	1,340	5,120
17	419	943	578	1,200	964	750	838	2,120	10,300	1,580	1,290	5,600
18	539	826	683	1,080	908	758	828	2,100	12,900	1,870	1,300	7,200
19	287	710	2,680	884	932	744	800	1,350	12,900	1,600	1,240	13,400
20	155	635	3,660	876	968	737	786	1,840	3,290	1,650	1,450	14,100
21	434	810	1,670	1,170	985	747	768	1,620	2,190	1,970	1,700	7,560
22	419	957	1,700	2,540	1,020	719	772	1,170	4,230	4,680	4,470	4,310
23	452	566	2,530	8,580	999	713	775	1,050	2,250	15,300	4,020	4,580
24	497	599	2,640	7,270	1,030	707	764	5,060	1,600	20,200	7,880	9,690
25	515	605	3,660	2,620	971	1,010	747	6,460	3,160	12,800	12,000	17,300
26	2,100	554	4,060	1,870	929	1,590	731	4,140	9,050	5,850	17,700	18,000
27	4,870	557	1,720	1,580	908	2,170	719	1,590	11,700	3,160	13,200	13,300
28	3,900	545	1,240	1,390	904	1,940	719	1,490	15,600	3,300	5,680	10,800
29	2,220	557	1,110	1,310	.....	1,430	731	1,270	13,400	3,000	3,210	6,710
30	530	506	1,050	1,310	.....	1,270	3,940	1,040	7,510	2,720	3,160	5,650
31	491	.....	964	1,090	.....	1,080	.....	964	.....	2,350	3,020	.....
1919-20.												
1	4,860	4,680	2,390	1,760	2,670	1,830	1,510	1,300	1,680	1,340	915	950
2	4,460	4,410	2,350	1,760	2,630	1,790	1,790	1,300	1,720	1,300	915	985
3	4,180	4,590	2,350	1,720	2,550	1,790	1,790	1,300	3,150	1,230	915	950
4	3,510	4,770	2,390	1,720	2,550	1,790	1,720	1,300	2,110	1,540	915	950
5	6,660	4,050	2,310	1,790	2,470	1,760	1,580	1,300	1,720	1,540	915	880
6	8,470	3,870	2,270	3,420	2,470	1,680	1,510	1,260	2,230	1,160	880	950
7	10,100	3,740	2,230	3,420	2,390	1,650	1,440	1,230	2,150	1,120	1,020	915
8	12,800	3,600	2,230	2,710	2,390	1,650	1,440	2,990	2,710	1,260	1,370	880
9	8,540	3,460	2,190	2,470	2,390	1,650	1,480	3,740	1,870	1,160	3,460	880
10	5,710	4,230	2,110	1,990	2,310	1,650	1,440	2,110	2,110	1,090	4,910	880
11	11,200	3,960	2,070	1,870	2,350	1,650	1,440	1,580	1,830	1,090	2,750	880
12	17,500	3,600	2,030	5,360	2,470	1,680	1,440	1,300	1,660	1,060	2,190	775
13	30,400	3,240	2,030	11,400	2,390	1,650	1,400	1,260	1,620	1,060	2,510	810
14	17,500	3,110	1,990	11,200	2,310	1,620	1,370	1,910	1,870	1,020	4,770	845
15	17,200	2,990	1,950	4,640	2,270	1,620	1,370	11,200	1,620	1,020	4,050	810
16	14,200	2,910	1,950	3,030	2,150	1,580	1,370	22,800	1,480	1,020	1,790	810
17	23,600	2,870	1,910	2,870	2,110	1,580	1,370	28,200	1,440	1,020	1,440	775
18	21,400	2,830	1,910	2,750	2,110	1,580	1,370	14,600	1,440	950	1,370	810
19	24,600	2,790	2,630	2,590	2,110	1,580	1,370	4,770	1,480	950	1,300	740
20	18,900	2,710	2,430	2,510	2,110	1,540	1,340	3,070	1,480	985	1,230	810
21	13,900	2,670	2,190	2,510	2,070	1,540	1,340	2,630	1,440	950	1,160	845
22	12,300	2,590	2,070	2,470	2,030	1,540	1,340	2,430	1,720	915	1,480	810
23	10,500	2,550	1,990	2,790	2,030	1,540	1,340	2,350	1,830	950	2,830	775
24	7,540	2,590	1,950	6,660	1,990	1,510	1,300	2,110	2,270	915	1,790	810
25	7,280	2,510	1,910	10,700	1,950	1,540	1,370	2,030	1,650	915	1,120	775
26	6,300	2,510	1,870	5,660	1,870	1,580	1,340	1,910	1,400	915	1,090	710
27	5,560	2,510	1,870	3,280	1,830	1,620	1,340	1,870	1,340	915	1,020	775
28	5,260	2,390	1,830	3,030	1,830	1,620	1,300	1,910	1,370	880	1,020	740
29	5,060	2,390	1,790	2,910	1,830	1,580	1,300	2,150	1,510	915	985	810
30	4,860	2,350	1,790	2,790	.....	1,540	1,300	1,760	1,340	880	950	710
31	4,820	.....	1,790	2,710	.....	1,510	.....	1,720	.....	1,160	950	.....

NOTE.—Daily discharge determined by indirect method for shifting control during following periods: Oct. 1 to Nov. 10, Dec. 27, 1918, to June 16, 1919, July 1–22, 1919, Jan. 27 to Mar. 5, and May 20 to Sept. 30, 1920. Oct. 13, 18, 1919, and May 16–17, 1920, water over road and gage not read. Probable stage estimated by comparison with United States Weather Bureau records at Gonzales dam. Discharge interpolated, Oct. 29 and Nov. 18, 1918. Minimum flow in October, 1918, probably caused by regulation at power plant above station. Records of discharge above 11,400 second-feet represent flow in main channel only; see "Channel and control."

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Monthly discharge of Guadalupe River near Gonzales, Tex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	4,870	155	776	47,700
November	2,450	299	734	43,700
December	4,060	479	1,310	80,600
January	8,580	668	1,510	92,800
February	1,200	904	1,020	56,600
March	2,170	707	954	58,700
April	6,470	719	1,340	79,700
May	6,650	786	2,230	137,000
June	15,600	831	4,610	274,000
July	20,200	1,580	4,030	248,000
August	17,700	1,240	3,530	217,000
September	18,000	1,480	5,700	339,000
The year	20,200	155	2,310	1,670,000
1919-20.				
October	30,400	3,510	11,300	695,000
November	4,770	2,350	3,250	193,000
December	2,630	1,790	2,090	129,000
January	11,400	1,720	3,760	231,000
February	2,670	1,830	2,230	128,000
March	1,830	1,510	1,630	100,000
April	1,790	1,300	1,430	85,100
May	28,200	1,230	4,240	261,000
June	3,150	1,340	1,780	106,000
July	1,540	880	1,070	65,800
August	4,910	880	1,740	107,000
September	985	710	835	49,700
The year	30,400	710	2,960	2,150,000

NOTE.—See footnote to daily-discharge table.

GUADALUPE RIVER BELOW CUERO, TEX.

LOCATION.—Three-fourths mile upstream from Heards Bridge on Arneckville road, 1 mile south of Dietze farmhouse, 2 miles below Clinton Bridge, 2½ miles southeast of Cuero, Dewitt County, 4 miles below Schleicher Bridge, and 8 miles below dam used for power development.

DRAINAGE AREA.—5,020 square miles (measured on standard topographic maps; post-route map; and topographic map of Texas compiled in 1899 by Robert T. Hill, of the United States Geological Survey; scale, 1 inch=25 miles).

RECORDS AVAILABLE.—August 6, 1916, to September 30, 1920. (Fragmentary from May 29, 1919, to August 10, 1920.) From December 26, 1902, to December 31, 1906, and August 19, 1915, to August 6, 1916, a station was maintained at Schleicher's Bridge, 4 miles above this point. Discharge at two sites practically the same.

GAGE.—Stevens water-stage recorder on left bank, inspected by E. B. Dietze.

DISCHARGE MEASUREMENTS.—Made from cable 40 feet upstream from gage, or by wading.

CHANNEL AND CONTROL.—Channel straight above and below station for 1,000 feet. Bed composed of gravel and small rock; clean and shifts slightly. Left bank composed of sand and dirt, covered with brush and open timber, and is 20 feet high, but at stages above a gage height of 20 feet is overflowed, the water submerging an area for one-fourth mile back from river; right bank composed of sand and dirt, covered with brush and trees on sloping side and cultivated land on top; high, and not subject to overflow. Rock and gravel rapids 250 feet below gage serve as a control during low and medium stages; shifts slightly.

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Extremes of discharge.—Maximum stage during year ending September 30, 1919, probably occurred during period July 23–28, when recorder was not in operation, and reached a height of about 30 feet as determined from flood marks on gage house (discharge, 55,000 second-feet); minimum stage, from water-stage recorder, 0.87 foot from 5 to 11 a. m. October 1 (discharge, 225 second-feet).

Maximum stage recorded during year ending September 30, 1920, 19.6 feet October 24 (discharge, 15,200 second-feet); minimum stage from water-stage recorder 1.68 feet at 2 a. m. September 18 (discharge, 703 second-feet).

1916–1920: Maximum stage in 1919 (see above); minimum stage from water-stage recorder, approximately 0.58 foot from 9 to 10 a. m. November 1, 1917 (discharge, 80 second-feet, determined from extension of rating curve and possibly slightly in error.

Ice.—None.

Diversions.—There are numerous small diversions above station for irrigation and municipal uses, but flow is probably not materially affected thereby except possibly during extremely low stages.

Regulation.—Flow partly regulated during low and medium stages by operation of water-power plants upstream, chiefly by a plant about 8 miles above.

Accuracy.—Stage-discharge relation practically permanent. Rating curve well defined between 200 and 15,000 second-feet. Water-stage recorder not in operation from July 11, 1919, to August 18, 1920. Daily discharge ascertained by applying mean daily gage height to rating table. Mean daily gage height from recorder-graph determined by inspection or on days of considerable fluctuations by use of planimeter. Records fair.

Discharge measurements of Guadalupe River below Cuero, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
1918.				1919.			
Oct. 11	McCashin and Congdon	1.20	488	May 31	J. E. Powers	2.89	1,360
20	do	3.70	2,010	July 19	Ellsworth and Dudley	3.78	2,160
Nov. 1	H. B. Kinnison	1.36	525	Oct. 24	D. A. Dudley	19.60	15,100
Dec. 1	E. P. Congdon	1.07	360				
1919.				1920.			
				June 25	T. Twichell	4.03	2,300
Jan. 6	C. E. McCashin	1.79	757	Aug. 5	do	2.38	1,190
24	Ellsworth and Kinnison	13.95	[a] 11,200	15	do	6.83	4,780
Feb. 12	H. B. Kinnison	2.32	1,100	Sept. 12	McCashin and West	2.12	938
Mar. 12	A. K. Gowans	2.06	981				

[a] Surface velocity observed and coefficient of 1.10 used to reduce to mean velocity.

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Daily discharge, in second-feet, of Guadalupe River below Cuero, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	315	535	469	1,070	1,370	1,000	1,500	3,940	.....	13,000	.....	.....
2	491	553	559	1,000	1,250	985	1,320	5,080	.....	12,100	.....	.....
3	475	442	559	920	1,250	1,060	1,760	2,030	.....	.....	2,050	.....
4	355	474	518	848	1,360	1,040	5,610	1,390	.....	.....	.....	.....
5	431	486	524	781	1,430	991	9,010	1,240	4,830	828	.....	.....
6	442	458	508	823	1,490	926	4,120	1,130	4,540	1,950	.....	.....
7	403	524	513	823	1,390	887	1,740	2,810	4,530	1,580	.....	1,620
8	270	559	480	787	1,230	874	1,440	6,550	3,640	1,320	.....	.....
9	589	408	403	763	1,160	874	1,250	5,730	3,440	1,230	.....	.....
10	577	763	458	721	1,160	874	1,090	7,950	4,600	.....	1,980	.....
11	727	2,210	524	715	1,100	874	978	6,280	6,550	.....	.....	.....
12	1,730	2,720	547	589	1,050	848	985	5,050	7,660	.....	.....	.....
13	1,820	2,400	2,000	661	991	817	972	5,220	7,640	.....	.....	.....
14	939	1,320	3,480	697	991	811	1,110	8,000	5,260	.....	.....	1,680
15	559	1,160	5,830	805	978	861	1,060	5,680	4,420	.....	.....	.....
16	502	1,950	2,670	4,480	932	817	952	2,420	6,470	.....	.....	.....
17	486	2,730	900	6,740	972	842	906	1,900	10,400	.....	3,580	.....
18	386	2,120	739	6,390	972	793	874	2,800	11,800	.....	.....	.....
19	474	1,230	2,720	2,360	960	817	854	3,450	13,800	.....	.....	.....
20	315	861	6,000	1,140	946	787	835	2,170	14,800	.....	.....	.....
21	408	1,180	6,890	1,080	1,020	787	829	2,620	.....	.....	.....	.....
22	649	2,530	3,160	2,820	1,020	811	823	2,280	.....	5,560	.....	.....
23	1,600	2,040	2,100	7,400	1,020	823	848	1,520	4,830	.....	.....	.....
24	1,260	991	2,330	10,200	1,060	887	861	2,580	4,700	.....	6,360	.....
25	932	757	3,660	10,300	1,060	1,080	811	6,580	3,600	.....	.....	.....
26	1,310	906	4,440	4,880	985	2,660	811	9,520	4,000	.....	.....	.....
27	5,520	958	4,540	2,400	998	3,510	848	11,700	9,220	.....	.....	.....
28	7,880	805	2,540	1,860	972	3,200	894	11,100	11,400	.....	.....	.....
29	9,970	703	1,640	1,590	.....	2,780	926	.....	12,100	4,750	.....	.....
30	3,520	583	1,360	1,460	.....	2,000	978	.....	12,800	.....	.....	.....
31	745	.....	1,220	1,430	.....	1,740	.....	1,520	.....	3,420	4,700	.....
1919-20.												
1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,060
2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	998
3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,100
4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,100
5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,170	1,030
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	978
7	.....	.....	.....	4,460	.....	.....	.....	.....	.....	.....	.....	1,200
8	.....	.....	2,720	.....	.....	.....	.....	.....	.....	.....	.....	1,090
9	.....	6,620	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,060
10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,100	1,060
11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,700	991
12	.....	.....	.....	4,780	.....	.....	.....	.....	.....	.....	3,820	984
13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,350	991
14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,580	1,010
15	.....	.....	2,350	.....	.....	1,980	.....	.....	.....	.....	4,300	984
16	.....	4,460	.....	.....	.....	.....	.....	.....	.....	.....	4,620	939
17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,500	946
18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,750	887
19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,680	900
20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,520	932
21	.....	.....	2,580	.....	.....	.....	.....	.....	.....	.....	1,450	913
22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,380	926
23	.....	3,740	.....	.....	.....	.....	.....	.....	.....	.....	1,600	939
24	15,200	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,950	900
25	.....	.....	.....	.....	.....	.....	.....	.....	2,350	.....	2,350	887
26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,560	854
27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,420	913
28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,280	894
29	.....	.....	2,420	.....	.....	.....	.....	.....	.....	.....	1,200	906
30	.....	3,020	.....	.....	.....	.....	.....	.....	.....	.....	1,170	1,560
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,140	.....

NOTE.—No record Mar. 9-11, May 15, 28, 1919, gage height interpolated. No record for periods not published. Gage heights partly estimated June 11, 14-16, 20, 23-30, July 1, 2, 1919, Aug. 30 to Sept. 12, 1920. Discharge from July 22, 1919, to Aug. 4, 1920, determined from one daily gage height reading on the days recorded; Aug. 5-18, 1920, two staff gage readings daily.

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Monthly discharge of Guadalupe River below Cuero, Tex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	9,970	270	1,490	91,600
November	2,730	408	1,180	70,200
December	6,890	403	2,070	127,000
January	10,300	589	2,530	156,000
February	1,490	932	1,110	61,600
March	3,510	787	1,230	75,600
April	9,010	811	1,570	93,400
May 1–28	11,700	1,130	4,600	255,000
The period				930,000
1920.				
August 10–31	4,700	1,140	2,290	99,900
September	1,560	854	996	59,400

NOTE.—See footnote to daily-discharge table.

SAN MARCOS RIVER AT SAN MARCOS, TEX.

LOCATION.—Just below Cape Ginning Co.'s mill, 300 feet southwest of main San Marcos-Luling highway, 1 mile southeast of San Marcos, Hays County, 1¼ miles above mouth of Blanco River, and 1½ miles below dam of San Marcos Utilities Co. and large springs that furnish a constant supply for the stream.

DRAINAGE AREA.—Indeterminate.

RECORDS AVAILABLE.—June 10, 1915, to January 19, 1916; March 13, 1916, to September 30, 1920. Miscellaneous measurements made from 1894 to 1903.

GAGE.—Stevens water-stage recorder on left bank, 300 feet below Cape Ginning Co.'s mill. Gage used June 10, 1915, to January 19, 1916, was vertical staff gage attached to the sewer trestle of San Marcos Utilities Co., 1,000 feet below Austin-San Antonio highway bridge, 1¼ miles above present site. Relation between datum of staff gage and that of water-stage recorder not known.

DISCHARGE MEASUREMENTS.—Made by wading or from San Marcos-Luling highway bridge half a mile above gage.

CHANNEL AND CONTROL.—Bed composed of gravel and sand with heavy aquatic growth which causes changes in control during practically the entire year. Channel straight for 200 feet above and below the station. Water clear, deep, and with scarcely any sediment except during floods, caused by local rains. Left bank wooded, high, and not subject to overflow; right bank wooded, low, and subject to overflow, the water spreading back a short distance to a second bank.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 15.54 feet at 5 p. m. July 21 (discharge not determined); minimum stage, 0.40 foot at 12.30 p. m. October 4 (discharge, 35 second-feet).

Maximum stage during year ending September 30, 1920, 30 feet May 15, determined from flood marks on recorder house (discharge not determined); minimum stage, 1.75 feet at 8 p. m. September 30 (discharge, 134 second-feet).

1915–1920: Maximum stage recorded in 1920 (see above); minimum stage, 0.34 foot at 12.50 p. m. September 26, 1918 (discharge, 11 second-feet).

ICE.—None.

DIVERSIONS.—A concrete dam just above the San Marcos-Luling road bridge makes a pond for Roger's resort and serves as a diversion dam for an irrigation plant on left bank; diversions intermittent, but when used takes about 95 second-feet from

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river. A water wheel is used to pump the water for irrigation and the water that passes through it is returned to the river above Cape Ginning Co.'s dam. About 1,000 feet above the station is a dam constructed for the purpose of creating a pond from which water was pumped to the lands on the south bank. Only pumping plant or diversions between station and mouth of Blanco River is about 250 feet below gage. Beckman dam just below mouth of Blanco River is used to impound water for irrigation. During ordinary stages in San Marcos and Blanco rivers, this dam backs water up San Marcos River a distance of three-quarters of a mile, but flood stages in Blanco River create backwater at the station. Records of the Board of Water Engineers of Texas show that about 1,000 acres have been declared irrigated in Hays County by diversions from San Marcos River. A large part of this area is located above the station. Little water is used for irrigation, as ordinarily the rainfall is sufficient to mature crops. Water is diverted above the station by the San Marcos Utilities Co. for municipal uses.

REGULATION.—Flow during low and medium stages regulated by dams above, the greatest effect being that produced by the power dam of the San Marcos Utilities Co. in the upper part of San Marcos, near the springs. This dam backs water over the springs that form the source of supply of the river during ordinary stages. Water is stored at this point throughout the afternoon and evening and released during the morning. Large fluctuations are also caused by operation of water wheel at Cape Ginning Co.'s mill.

ACCURACY.—Stage-discharge relation not permanent owing to moss and weeds in channel. Rating curve fairly well defined between 40 and 360 second-feet. Operation of water-stage recorder not satisfactory, as indicated in the footnote to daily-discharge table. Daily discharge ascertained by indirect method for shifting control, using mean daily gage height determined by inspecting recorder graph, or for days of considerable fluctuation by planimeter. Records fair.

Discharge measurements of San Marcos River at San Marcos, Tex., during the years ending Sept. 30, 1919, and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 8	R. J. Hank	0.77	45.7	Nov. 9	L. D. Snow	3.60	338
Dec. 3	Gowans and Kinnison	1.39	83.4	Dec. 19	C. E. Ellsworth	3.08	257
21	Ellsworth and Kinnison	2.46	165	31	Ellsworth and Pritchett	3.10	218
1919.				1920.			
Feb. 9	Ellsworth and Congdon	2.09	123	Jan. 20	do	2.98	235
Mar. 11	A. K. Gowans	2.05	101	Feb. 6	do	3.22	254
Apr. 5	R. J. Hank	2.51	150	21	C. E. Ellsworth	3.00	220
24	C. E. Ellsworth	2.80	155	Mar. 17	McCashin and Pritchett	2.96	209
27	do	2.78	147	Apr. 10	C. E. Ellsworth	2.78	196
June 2	J. E. Powers	2.75	180	May 6	D. A. Dudley	2.44	162
July 16	Ellsworth and Dudley	3.24	152	June 3	C. E. Ellsworth	3.59	243
Aug. 20	T. Twichell	3.06	149	23	T. Twichell	3.21	223
Sept. 5	Dudley and Twichell	2.83	155	July 27	Ellsworth and Twichell	2.63	181
Oct. 23	L. D. Snow	4.45	350	Sept. 6	McCashin and West	2.39	189

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Daily discharge, in second-feet, of San Marcos River at San Marcos, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	83	82	93	132	122	121	140	135	169	170	.....	.....
2	81	81	93	131	123	121	162	141	175	155	.....	.....
3	79	84	93	131	122	121	153	133	171	151	.....	164
4	78	84	93	129	122	123	149	131	161	150	.....	165
5	76	85	95	129	126	122	145	137	161	143	.....	166
6	76	86	94	128	130	122	150	194	163	150	.....	163
7	75	85	94	128	123	114	150	254	147	146	.....	163
8	72	87	96	126	121	107	150	160	162	198	.....	160
9	72	88	96	125	116	109	156	170	154	147	.....	158
10	71	88	99	126	115	108	151	162	164	147	.....	157
11	75	87	100	125	114	100	153	196	166	140	.....	154
12	74	88	102	124	118	103	158	241	157	149	.....	159
13	76	88	108	124	117	106	157	173	150	144	.....	160
14	75	89	115	124	117	106	150	155	143	131	.....	163
15	77	90	142	132	117	116	150	167	155	138	.....	237
16	74	89	146	127	123	134	154	139	267	154	.....	205
17	76	90	145	125	126	130	147	150	264	136	.....	176
18	75	90	144	126	124	129	145	154	174	130	.....	169
19	76	91	145	126	126	130	149	156	169	126	.....	169
20	77	92	161	124	124	131	146	156	170	123	146	167
21	77	93	143	138	124	129	148	153	160	.....	145	170
22	78	92	144	239	123	122	146	155	164	.....	148	218
23	78	91	218	154	124	125	147	156	162	225	156	431
24	78	92	197	144	124	127	149	157	158	.....	150	220
25	78	93	150	143	122	138	145	164	222	.....	.....	205
26	84	93	143	141	120	133	149	164	208	.....	.....	194
27	81	93	141	140	120	130	134	163	200	.....	.....	187
28	80	93	138	138	120	132	142	160	280	.....	.....	188
29	81	92	138	137	.....	129	173	162	165	.....	.....	178
30	80	91	137	136	.....	126	138	167	158	.....	.....	182
31	82	.....	136	131	.....	134	.....	171	.....	.....	.....	.....
1919–20.												
1	179	354	.....	212	305	.....	212	189	.....	218	174	194
2	174	372	.....	212	282	.....	218	174	.....	212	174	200
3	169	372	.....	206	260	.....	218	189	206	212	169	200
4	174	372	.....	206	267	.....	200	179	206	189	174	200
5	179	372	.....	232	267	.....	212	174	212	194	174	194
6	238	381	.....	225	267	.....	212	189	290	194	174	194
7	408	381	.....	218	260	.....	212	174	245	212	435	189
8	206	381	.....	218	260	.....	206	179	212	189	274	189
9	194	381	.....	212	267	.....	212	184	206	189	194	189
10	218	381	.....	206	267	.....	206	184	200	174	189	194
11	.....	.....	.....	232	260	.....	206	189	200	184	184	200
12	354	.....	.....	305	260	.....	206	184	200	184	206	194
13	338	.....	.....	267	260	.....	200	218	194	184	.....	189
14	363	.....	.....	.....	252	.....	206	435	206	179	200	194
15	.....	.....	.....	.....	252	.....	212	.....	200	179	232	200
16	.....	.....	.....	.....	238	.....	194	.....	206	174	218	189
17	.....	.....	.....	.....	245	206	200	.....	206	179	218	189
18	509	.....	.....	.....	245	206	200	.....	200	189	218	179
19	471	346	252	.....	238	194	194	.....	212	184	218	184
20	490	.....	252	260	232	200	194	.....	200	184	212	184
21	399	.....	245	260	232	194	194	.....	206	184	212	184
22	372	.....	245	267	238	206	206	.....	212	179	206	189
23	354	.....	238	390	238	206	206	.....	212	179	206	189
24	354	.....	245	329	.....	200	184	.....	206	179	206	184
25	338	.....	238	313	.....	206	189	.....	200	184	206	179
26	346	.....	238	297	.....	200	184	.....	206	174	200	179
27	346	.....	225	290	.....	206	179	.....	200	179	200	184
28	346	.....	225	282	.....	200	170	.....	225	169	200	184
29	354	.....	225	282	.....	200	174	.....	212	179	200	174
30	354	.....	212	282	.....	200	189	.....	206	184	200	179
31	354	.....	212	346	.....	206	.....	.....	.....	169	194	.....

NOTE.—Discharge not determined for following days because stage, as given, was above limit for which rating curve is defined: July 21, 1919, 8.69 feet; July 22, 7.35 feet; Oct. 11, 13.3 feet; Oct. 15, 6.5 feet; Oct. 16, 6.6 feet; Oct. 17, 8.7 feet; Aug. 13, 1920, 5.8 feet; no record for other periods for which discharge is not given. Discharge partly estimated, Nov. 19 and Dec. 19, 1919; Jan. 13, 20, Feb. 23, Mar. 17, June 3, and Sept. 10, 1920.

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Monthly discharge of San Marcos River at San Marcos, Tex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	84	71	77.3	4,750
November	93	81	88.9	5,290
December	218	93	127	7,810
January	239	124	135	8,300
February	130	114	122	6,780
March	138	100	122	7,500
April	173	134	150	8,930
May	254	131	164	10,100
June	280	143	177	10,500
July 1-20	198	123	146	5,790
August 20-24	156	145	149	1,480
September 3-30	431	154	187	10,400
1919-20.				
December 19-31	252	212	235	6,060
February 1-23	305	232	256	11,700
March 17-31	206	194	202	6,010
April	218	174	200	11,900
May 1-14	435	174	203	5,640
June 3-30	290	194	210	11,700
July	218	169	186	11,400
September	200	179	189	11,200

NOTE.—See footnote to table of daily discharge.

SAN MARCOS RIVER AT OTTINE, TEX.

LOCATION.—At highway bridge one-fourth mile southwest of Ottine, Gonzales County, 4 miles below mouth of Plum Creek, and 10 miles above confluence of San Marcos and Guadalupe rivers.

DRAINAGE AREA.—Indeterminate.

RECORDS AVAILABLE.—June 22, 1915, to September 30, 1920.

GAGE.—Chain gage attached to upstream handrail of bridge; read by J. H. Kaine. Gage used from June 22 to October 12, 1915, was a vertical staff under the highway bridge, but gage heights have been reduced to datum of succeeding gage by means of a curve showing relation between readings of the two gages. Gage used from October 13, 1915, to March 15, 1920, was vertical staff in four sections attached to trees on left bank about 400 feet above bridge.

DISCHARGE MEASUREMENTS.—Made from downstream side of highway bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of sand, rock, and gravel; shifts. Bank high and wooded; not overflowed except by extremely high water. Channel straight above and below the station for 150 feet. Low-stage control for gage used before March 15, 1920, formed by shoal 200 feet below gage. During high stages in Guadalupe River backwater changes stage-discharge relation.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 34.6 feet at 8 a. m. July 23 (discharge, 11,100 second-feet, determined from extension of rating curve); minimum stage, 1.20 feet at 6 a. m. October 6 (discharge, 60 second-feet).

Maximum stage recorded during year ending September 30, 1920, 37.5 feet at 7.30 a. m. May 16 (discharge, not determined); minimum stage, 2.6 feet at 6 p. m September 25 (discharge, 196 second-feet).

1915-1920: Maximum stage recorded in 1920 (see above paragraph); minimum stage, 1.06 feet at 7 p. m. August 26 and 27, 1917, and 6.30 p. m. July 31, 1918. (discharge, 26 second-feet).

ICE.—None.

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DIVERSIONS.—Small amounts of water are diverted above the station for irrigation and municipal uses, but only a small part of the total run-off is used (see "San Marcos River at San Marcos"). Little, if any, water is diverted below the station.

REGULATION.—Flow regulated by the operation of a small cotton gin a short distance above the station. The operation of several small water-power plants in the upper drainage basin near San Marcos and Martindale does not materially affect the flow at this station.

ACCURACY.—Stage-discharge relation not permanent. Rating curve fairly well defined from 50 to 7,500 second-feet; extended above. Gage read twice daily to hundredths October 1, 1918, to May 6, 1919, and to tenths May 7, 1919, to September 30, 1920, but mean of two readings a day may not be true mean owing to power regulation above. Daily discharge ascertained by applying mean daily gage height to rating table; shifting-control method used January 22, 1919, to September 30, 1920. Records fair.

Discharge measurements of San Marcos River at Ottine, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Ft.*	*Sec.-ft.*	1919.		*Ft.*	*Sec.-ft.*
Oct. 31	McCashin and Congdon.	1.58	91.0	Oct. 24	L. D. Snow	10.77	1,990
1919.				1920.			
Jan. 6	C. E. McCashin	2.28	195	Feb. 6	Ellsworth and Pritchett	6.20	805
Feb. 7	Ellsworth and Congdon	3.30	341	Mar. 16	McCashin and Pritchett	[a] 4.22	460
8	do	3.03	299	June 24	T. Twichell	7.25	935
Mar. 11	A. K. Gowans	2.58	213	July 27	Ellsworth and Twichell	3.16	275
June 1	J. E. Powers	3.10	294	Sept. 14	McCashin and West	3.04	269
July 18	Ellsworth and Dudley	4.65	494				

[a] Gage moved this date; new datum.

Daily discharge, in second-feet, of San Marcos River at Ottine, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	72	87	83	217	368	273	154	1,070	312	1,920	850	395
2	73	80	83	185	350	254	612	359	1,930	850	778	386
3	73	83	82	174	341	241	5,440	191	843	694	706	324
4	76	82	83	162	386	236	1,140	140	452	449	606	324
5	70	83	74	175	350	229	326	204	353	341	625	324
6	66	82	97	190	341	224	316	217	294	577	596	316
7	112	81	99	196	348	220	364	1,410	319	577	625	333
8	71	81	104	198	343	224	277	4,610	319	998	539	290
9	71	465	110	166	268	227	277	1,560	319	1,760	467	324
10	73	174	99	166	261	212	248	932	2,220	766	706	333
11	95	185	93	166	251	214	254	1,610	2,940	634	644	299
12	74	143	93	162	248	186	268	5,440	657	539	530	282
13	79	143	3,350	156	243	188	268	4,190	319	395	521	307
14	74	143	1,940	148	232	186	266	750	231	359	412	341
15	74	135	156	186	220	186	244	526	1,740	440	413	3,060
16	72	142	143	62	209	180	244	545	5,170	440	503	6,180
17	72	132	137	848	209	220	234	364	7,650	440	503	1,330
18	71	109	261	214	243	219	227	1,190	8,870	494	577	3,690
19	66	99	2,630	80	260	196	232	1,450	3,000	377	503	778
20	65	110	1,400	146	260	212	217	1,120	1,010	449	503	625
21	65	101	932	81	234	196	217	490	2,990	706	663	802
22	70	99	375	6,000	244	169	215	329	2,030	7,640	2,200	886
23	72	97	670	5,280	263	188	194	338	558	9,810	2,870	3,560
24	81	95	2,440	1,110	277	219	196	4,000	316	6,330	790	5,780
25	81	93	1,060	596	294	461	194	4,330	3,670	4,510	503	2,620
26	958	104	411	485	288	648	190	2,320	5,880	2,000	404	1,210
27	4,830	99	348	440	277	461	178	657	8,120	706	413	838
28	568	98	294	386	273	300	145	524	5,990	1,190	467	814
29	114	95	170	377	.....	251	3,530	380	2,000	1,340	422	1,040
30	116	95	86	404	.....	236	2,210	336	1,010	998	404	838
31	98	.....	158	404	.....	236	.....	322	.....	886	386	.....

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Daily discharge, in second-feet, of San Marcos River at Ottine, Tex., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	776	1,330	776	492	824	680	547	348		438	280	366
2	728	970	752	492	752	680	642	331		438	280	366
3	604	1,200	848	510	776	623	623	314	800	420	280	366
4	704	1,120	824	474	872	661	492	314		402	280	366
5	1,170	1,100	642	623	824	704	456	314		384	263	384
6	.....	1,140	680	2,510	872	661	402	297	728	348	280	297
7	.....	1,040	604	1,590	776	566	366	314	2,150	348	246	297
8	.....	995	680	1,070	776	547	384	3,180	776	348	1,560	297
9	1,810	995	642	824	728	566	384	1,560	800	348	1,810	212
10	1,250	2,630	623	680	824	528	384	456	704	348	848	297
11	.....	1,330	604	661	752	528	384	474	776	331	566	297
12	.....	1,020	623	6,630	776	528	384	331	704	314	1,480	348
13	.....	1,070	585	6,510	848	528	384	314	824	297	3,750	263
14	.....	824	680	3,550	752	528	366	2,930	776	314	4,260	280
15	.....	752	604	1,170	680	528	384	6,740	623	297	1,270	331
16	.....	776	604	970	680	492	384	11,900	510	314	680	331
17	.....	680	661	896	680	456	384	8,280	474	280	566	280
18	.....	680	642	800	824	456	348	3,750	456	280	528	331
19	.....	680	848	824	728	456	366	2,390	547	314	474	229
20	.....	623	752	800	680	438	366	1,300	547	331	456	331
21	.....	604	824	896	680	438	366	896	456	297	456	263
22	.....	566	704	920	680	438	366	848	510	280	3,270	263
23	.....	566	642	1,330	680	420	348	752	1,120	297	1,040	229
24	2,010	585	661	7,150	680	420	348	642	1,270	297	547	246
25	.....	642	604	5,410	728	438	331	704	776	297	492	212
26	.....	680	510	1,900	728	492	348	776	420	246	420	229
27	.....	704	510	1,250	680	492	314	752	420	246	456	229
28	.....	680	510	1,200	704	456	314	1,300	528	280	456	263
29	1,510	661	510	1,170	680	420	331	752	456	280	348	229
30	1,480	752	510	1,120	.....	402	348	740	456	510	348	229
31	1,270	.....	510,	1,040	.....	420	.....	730	.....	420	314	.....

NOTE.—No record, Oct. 6–8, 11–23, and 25–28, 1919; May 30–31, and June 1–5, 1920. Discharge, May 30, 31, and June 1–5, 1920, estimated by comparison with other records. Braced figures show estimated mean discharge for periods included. Discharge above 2,000 second-feet Aug. 1, 1919, to Mar. 15, 1920, subject to considerable error because of uncertain changes in datum of high-water section of gage.

Monthly discharge of San Marcos River at Ottine, Tex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	4,830	65	276	17,000
November	465	80	120	7,140
December	3,350	74	583	35,800
January	6,000	62	631	38,800
February	386	209	281	15,600
March	648	169	248	15,200
April	5,440	145	629	37,400
May	5,440	140	1,350	83,000
June	8,870	231	2,380	142,000
July	9,810	341	1,600	98,400
August	2,870	386	682	41,900
September	6,180	282	1,290	76,800
The year	9,810	62	841	609,000
1919-20.				
November	2,630	566	913	54,300
December	848	510	651	40,000
January	7,150	474	1,790	110,000
February	872	680	747	43,000
March	704	402	516	31,700
April	642	314	395	23,500
May	11,900	297	1,770	109,000
June	2,150	420	927	55,200
July	510	246	334	20,500
August	4,260	246	913	56,100
September	384	212	289	17,200
The period	.....	.....	.....	560,000

NOTE.—See footnote to daily-discharge table.

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SAN ANTONIO RIVER BASIN.

SAN ANTONIO RIVER AT SAN ANTONIO, TEX.

LOCATION.—At South Alamo Street Bridge in San Antonio, Bexar County, 4 miles below San Antonio Springs, source of normal flow of river, and 1¼ miles above mouth of San Pedro Creek.

DRAINAGE AREA.—Indeterminate.

RECORDS AVAILABLE.—January 26, 1915, to September 30, 1920. Miscellaneous discharge measurements were made from 1895 to 1906.

GAGE.—Gurley graph water-stage recorder on right bank at downstream side of bridge. Gage used from January 26, 1915 to February 28, 1916, was vertical staff attached to downstream side of middle pier of Commerce Street Bridge. Gage used from February 29, 1916, to April 8, 1920, was vertical staff attached to upstream side of second bent of Presa Street Bridge. Relation of readings on different gages not determined. Discharge at various gages is probably not materially different.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge or by wading.

CHANNEL AND CONTROL.—Channel is straight for 100 feet below gage and curved above. Bed composed of sand, gravel, and silt. Control formed by gravel bar; shifts.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 7.70 feet at 1 p. m. September 15 (discharge, 2,380 second-feet); minimum stage, 0.58 foot on several days during November and December (discharge, 7.0 second-feet).

Maximum stage recorded during year ending September 30, 1920, 7.8 feet at Presa Street gage on night of October 16, determined from flood marks on gage (discharge, 2,430 second-feet, determined from extension of rating curve); minimum stage, 1.43 feet at South Alamo Street gage at 4 p. m. September 13, owing to regulation at power dam above gage (discharge, 97 second-feet). Minimum natural flow stage, 1.73 feet on September 30 (discharge, 119 second-feet).

1914–1920: Maximum stage recorded, 14.0 feet at 5.30 p. m. October 23, 1914 (discharge, 4,700 second-feet, determined from extension of rating curve); minimum stage, 0.58 foot on several days during November and December, 1918 (discharge, 7.0 second-feet).

ICE.—None.

DIVERSIONS.—Quantity of water diverted above gage not known but is believed to be immaterial. Considerable land is irrigated from diversions below the gage.

REGULATION.—The operation of water wheels at the Guenther flour mill just above the gage causes frequent but unimportant fluctuations in stage.

ACCURACY.—Stage-discharge relation not permanent owing principally to aquatic growth on control. Some of the change that occurred during the period of April 8 to July 1, 1920, may have been caused by movement of débris deposited in river during installation of water-stage recorder. Rating curve used October 1, 1918, to April 7, 1920, for staff gage at Presa Street well defined below 250 second-feet and fairly well defined from 250 to 1,500 second-feet; curve used April 8 to September 30, 1920, for recording gage at South Alamo Street, well defined from 115 to 150 second-feet. Staff gage read to hundredths twice daily and oftener during high water. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying mean daily gage height to rating table; shifting-control method used October 1, 1918, to October 5, 1919, December 31, 1919, to January 31, 1920, and March 12 to July 8, 1920. Records good except those obtained by indirect method for shifting control, which are fair.

The normal flow of San Antonio River comes from springs within the city limits, but two tributaries from the north furnish considerable run-off at times of heavy precipitation. Changes in stage during low flow are believed to be due to pumping from deep wells for the city water supply and the use of artesian water for irrigation in areas adjacent to the river for it is thought that the wells draw from the underground reservoir that feeds the river by springs.

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Discharge measurements of San Antonio River at San Antonio, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet*	*Sec.-ft.*
Oct. 12	McCashin and Congdon.	0.63	10.9	Dec. 16	C. E. Ellsworth	2.06	200
Nov. 29	E. P. Congdon	.59	7.6	30	Ellsworth and Pritchett	2.04	194
1919.				1920.			
Jan. 23	A. K. Gowans	.86	35.5	Jan. 23	do	2.15	281
Feb. 3	Ellsworth and Congdon	.94	40.4	Feb. 1	D. A. Dudley	2.10	218
Mar. 12	E. P. Congdon	.90	34.5	19	C. E. Ellsworth	2.13	206
Apr. 17	Ellsworth and Quarles	.98	41.7	Mar. 10	McCashin and Pritchett.	2.10	212
May 14	C. E. Ellsworth	1.08	45.8	Apr. 8	C. E. Ellsworth	[a] 1.91	182
June 27	R. J. Hank	1.40	98.0	May 7	D. A. Dudley	1.86	162
July 21	Twichell and Dudley	1.76	160	June 27	T. Twichell	2.04	162
Sept. 3	D. A. Dudley	1.34	89.4	July 9	C. E. Ellsworth	2.00	146
15	Dudley and Twichell	6.35	1,440	30	T. Twichell	1.92	135
15	do	4.32	689	Sept. 7	McCashin and West	1.78	127
16	do	1.82	146				

[a] New gage put in operation; datum changed.

Daily discharge, in second-feet, of San Antonio River at San Antonio, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	12	11	8.0	11	39	34	34	38	42	70	104	87
2	12	8.5	7.5	11	37	34	93	39	40	102	102	86
3	12	11	8.0	10	39	34	42	38	40	72	100	83
4	12	9.0	8.0	12	76	38	41	38	37	70	100	81
5	11	8.5	8.0	9.5	39	34	45	38	35	72	100	81
6	11	9.0	8.5	11	37	33	47	36	35	129	100	81
7	10	7.5	8.0	14	36	32	50	43	35	79	100	81
8	10	9.0	8.0	11	36	34	50	39	34	73	100	81
9	11	8.0	7.5	11	36	33	50	36	34	72	100	81
10	11	8.5	7.5	12	37	33	48	37	110	72	96	81
11	70	9.0	7.5	9.5	39	32	48	138	38	73	94	81
12	10	9.5	8.0	10	42	32	48	47	41	73	92	81
13	10	10	11	10	42	31	48	46	34	76	90	81
14	10	17	7.0	11	38	32	48	47	36	76	88	98
15	10	17	7.5	50	35	31	47	47	35	74	87	1,820
16	10	9.5	7.0	13	34	24	45	145	35	76	81	126
17	10	8.5	7.5	10	52	24	41	60	35	74	81	166
18	10	9.0	50	10	34	24	40	50	34	74	80	126
19	10	10	119	10	41	25	40	56	32	73	100	126
20	10	10	12	11	37	25	37	49	32	70	81	126
21	11	10	8.0	260	36	24	36	48	31	119	112	132
22	41	10	9.0	154	34	24	34	47	30	634	81	586
23	11	9.5	124	35	33	24	33	46	30	430	81	170
24	10	8.0	13	39	34	33	32	139	35	111	81	143
25	12	8.5	12	36	36	63	31	46	145	102	81	143
26	58	8.5	12	57	34	30	31	47	601	105	104	143
27	14	9.5	11	63	35	30	31	46	102	120	86	143
28	8.0	7.0	11	37	35	32	31	46	80	105	86	152
29	11	7.5	11	38	.....	32	159	45	72	108	87	152
30	10	7.5	11	38	.....	32	39	43	70	105	87	152
31	11	.....	12	38	.....	34	.....	43	.....	105	86	.....

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Daily discharge, in second-feet, of San Antonio River at San Antonio, Tex., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	152	398	211	201	213	213	238	168	170	162	135	127
2	152	245	236	203	213	213	193	164	172	161	137	126
3	152	232	209	205	213	213	191	166	175	159	135	126
4	152	232	209	207	213	213	185	163	172	157	135	126
5	152	230	209	338	213	213	181	162	168	154	135	128
6	363	230	209	243	213	213	176	163	150	152	134	129
7	220	230	207	236	213	209	176	164	152	150	143	128
8	180	230	205	234	213	209	182	163	151	148	133	127
9	170	230	205	230	213	209	182	164	151	146	136	126
10	170	230	205	232	213	209	185	167	151	144	135	125
11	985	230	205	238	213	209	185	166	152	144	134	124
12	273	230	205	478	213	207	185	166	153	147	133	123
13	295	230	205	299	213	205	184	181	153	145	146	125
14	205	230	205	271	213	207	184	182	154	144	135	123
15	700	230	205	266	220	207	184	168	153	143	133	123
16	1,040	230	203	262	222	205	184	167	152	143	137	123
17	328	230	201	260	222	203	182	168	153	141	136	123
18	251	230	226	260	222	203	181	168	153	138	135	121
19	251	230	226	262	222	201	182	170	156	142	134	120
20	251	230	211	264	222	199	181	170	162	139	134	123
21	275	230	209	266	222	197	181	168	157	137	134	122
22	249	230	209	269	217	197	178	170	157	137	134	122
23	240	226	209	315	217	195	178	170	164	135	135	121
24	240	224	209	280	217	193	178	171	157	135	133	120
25	240	220	207	264	217	207	178	170	158	133	133	119
26	243	217	205	251	217	203	184	170	159	135	131	119
27	243	217	205	245	217	201	170	168	161	133	131	123
28	243	213	199	238	217	201	170	168	164	132	129	120
29	243	213	197	232	213	199	171	168	162	134	128	120
30	243	213	197	226	.....	195	168	167	161	138	130	119
31	243	.....	199	220	.....	191	.....	170	.....	136	128	.....

NOTE.—Discharge, June 26, July 22, and Sept. 15, 1919, determined from extension of rating curve and subject to considerable error. Discharge, Apr. 25 and July 4–8, 1920, estimated or interpolated.

Monthly discharge of San Antonio River at San Antonio, Tex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	70	8.0	15.1	928
November	17	7.0	9.52	566
December	124	7.0	17.7	1,090
January	260	9.5	33.9	2,089
February	76	33	38.7	2,150
March	63	24	31.5	1,940
April	159	31	46.6	2,770
May	145	36	53.6	3,300
June	601	30	66.3	3,950
July	634	70	116	7,130
August	112	80	91.9	5,650
September	1,820	81	186	11,100
The year	1,820	7.0	58.8	42,700
1919–20.				
October	1,040	152	295	18,100
November	398	213	233	13,900
December	236	197	208	12,800
January	478	201	258	15,900
February	222	213	216	12,400
March	213	191	204	12,300
April	238	168	183	10,900
May	182	162	168	10,300
June	175	150	158	9,400
July	162	132	143	8,790
August	146	128	134	8,240
September	129	119	123	7,320
The year	1,040	119	194	141,000

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SAN ANTONIO RIVER AT CALAVERAS, TEX.

LOCATION.—One-fourth mile south of San Antonio & Arkansas Pass Railway station in town of Calaveras, Wilson County, 1 mile below mouth of Calaveras Creek, and 10 miles below mouth of Medina River.

DRAINAGE AREA.—1,870 square miles (measured on topographic map of Texas, compiled in 1899 by Robert T. Hill, of the United States Geological Survey; scale, 1 inch = 25 miles.

RECORDS AVAILABLE.—March 12, 1918, to September 30, 1920.

GAGE.—Vertical staff in five sections on left bank near old brick plant; read by J. W. Dodson, C. B. Adams, and I. M. Smith.

DISCHARGE MEASUREMENTS.—Made from highway bridge half a mile upstream from gage or by wading below gage.

CHANNEL AND CONTROL.—Bed composed of sand and clay and free from vegetation; shifts. Channel straight above and below station for 150 feet. Left bank high, wooded, and not subject to overflow; right bank steep, wooded, and subject to overflow only at extremely high stages. Old bricks piled into channel form a semipermanent low-water control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 38 feet at midnight, September 24 (discharge, 15,100 second-feet, determined from extension of rating curve); minimum stage, 0.12 foot at 6.30 a. m. October 5 (discharge, 25 second-feet).

Maximum stage recorded during year ending September 30, 1920, 32.2 feet at 8.35 a. m. October 7 (discharge, 10,800 second-feet, determined from extension of rating curve); minimum stage, 2.0 feet September 30 (discharge, 146 second-feet).

1918–1920: Maximum stage recorded in 1919 (see above); minimum discharge, 15 second-feet September 14, 1918.

ICE.—None.

DIVERSIONS.—The Medina dam and reservoir, having a storage capacity of 254,000 acre-feet, is located on Medina River about 50 miles above its confluence with the San Antonio. The diversion works having a capacity of 850 second-feet are 4 miles below the Medina dam. There were probably about 10,000 acres under irrigation in this project in 1919 and 1920.

REGULATION.—The ordinary flow may be slightly affected by storage and diversions on Medina River.

ACCURACY.—Stage-discharge relation not permanent. Rating curve fairly well defined between 30 and 1,500 second-feet, and extended above by use of $A\sqrt{d}$ method, using one measurement at a discharge of 11,000 second-feet as a basis. Gage read to hundredths twice daily and oftener during floods. Mean of two daily readings may not be true index to mean for day, owing to regulation and rapidly changing stage. Shifting-control method used throughout the two-year period except November 15–26, 1918, and May 1 to June 27, 1919, when discharge was ascertained by direct application of mean daily gage height to rating table. Record fair for low and medium stages and poor for high stages.

Discharge measurements of San Antonio River at Calaveras, Tex., during the years ending Sept. 30, 1919, and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918		*Feet.*	*Sec.-ft.*	1920		*Feet.*	*Sec.-ft.*
Oct. 21	McCashin and Congdon	0.49	36.3	Jan. 21	C. E. Ellsworth	6.92	706
1919				Feb. 18	do	6.11	588
Jan. 23	A. K. Gowans	22.45	4,420	Mar. 11	McCashin and Pritchett	5.03	453
31	Ellsworth and Congdon	2.38	115	Apr. 9	C. E. Ellsworth	4.50	363
May. 13	C. E. Ellsworth	3.98	282	May 8	D. A. Dudley	3.61	270
July. 21	Dudley and Twichell	3.35	221	June 26	T. Twichell	3.48	282
22	do	19.20	3,240	July 9	C. E. Ellsworth	3.04	231
Aug. 21	T. Twichell	2.32	133	Sept. 9	McCashin and West	2.32	172

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Daily discharge, in second-feet, of San Antonio River at Calaveras, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	34	47	47	64	109	89	72	282	79	168	187	120
2	33	48	46	64	108	84	93	120	79	154	179	118
3	32	47	45	59	104	85	1,150	140	82	182	174	119
4	34	46	44	57	160	82	242	99	83	470	172	112
5	28	50	42	57	215	82	120	98	74	148	165	114
6	31	46	42	56	127	88	102	94	74	146	159	114
7	32	74	42	58	102	83	99	100	72	615	155	116
8	32	102	44	68	96	83	96	187	72	645	150	113
9	31	155	44	61	100	85	95	167	64	211	144	120
10	32	51	43	58	100	135	92	98	178	167	459	114
11	34	46	45	56	97	217	86	514	306	148	162	109
12	234	44	44	53	97	93	85	1,020	122	133	146	112
13	72	44	243	54	97	81	85	312	85	130	136	114
14	52	46	146	54	91	78	84	146	70	126	130	108
15	42	358	87	64	91	74	82	115	84	126	125	3,000
16	38	268	47	242	88	68	81	463	77	121	124	5,620
17	36	88	44	134	90	64	75	348	78	114	118	7,730
18	35	76	137	74	144	64	74	154	78	113	113	10,800
19	37	49	460	68	101	61	72	108	72	104	134	10,000
20	36	46	945	64	98	62	68	113	70	102	156	6,450
21	35	45	254	64	99	60	68	100	66	158	308	3,980
22	270	46	122	3,570	90	60	68	100	66	3,380	800	2,990
23	865	52	603	7,420	91	61	68	90	68	2,660	524	5,030
24	140	103	1,410	697	87	60	68	758	76	3,240	270	12,800
25	74	84	380	424	91	73	68	470	364	956	144	13,200
26	728	64	118	172	88	300	64	286	580	542	136	8,940
27	1,480	179	86	165	85	96	64	114	3,370	494	179	6,070
28	184	167	77	300	84	74	66	98	1,990	403	205	4,340
29	77	88	72	150	.....	73	2,120	90	345	264	147	3,340
30	52	48	72	126	.....	72	1,230	87	211	212	130	3,020
31	50	.....	70	115	.....	72	.....	85	.....	195	125	.....
1919–20.												
1	2,650	1,940	742	498	678	470	361	274	310	274	208	198
2	2,340	2,680	758	498	678	456	400	262	286	262	208	179
3	2,110	2,340	790	484	663	456	428	262	710	262	198	179
4	1,940	2,030	774	484	663	428	456	262	558	274	198	179
5	1,790	1,840	742	573	663	428	414	262	348	262	198	179
6	3,900	1,680	838	918	663	428	374	251	335	262	198	179
7	8,660	1,530	742	774	648	442	374	251	348	251	198	179
8	3,870	1,430	726	618	648	442	374	274	322	240	251	179
9	2,620	1,370	710	588	648	442	361	286	310	229	208	170
10	2,480	1,370	678	543	648	543	348	274	298	229	198	162
11	6,080	1,290	678	543	633	484	348	274	286	218	198	162
12	4,220	1,270	633	1,600	663	442	348	262	286	218	198	162
13	2,510	1,180	618	1,550	838	442	335	262	335	218	274	170
14	2,340	1,130	774	982	633	442	335	1,940	335	218	387	170
15	2,240	1,080	648	902	633	442	322	742	322	206	348	170
16	5,060	1,060	588	838	603	428	322	790	298	198	251	162
17	9,010	1,050	558	726	588	414	310	442	286	198	240	162
18	9,170	1,030	558	726	588	400	310	484	240	198	229	162
19	8,790	998	694	710	588	400	298	498	310	198	218	162
20	6,740	982	633	710	573	400	298	414	361	198	218	162
21	6,400	950	648	694	573	387	298	387	694	198	218	162
22	4,350	934	618	678	558	374	298	387	588	198	218	162
23	3,330	918	742	742	558	374	286	361	442	198	229	162
24	2,980	902	742	902	543	374	274	335	322	198	218	154
25	2,680	902	573	806	543	387	286	322	274	198	208	154
26	2,400	886	558	742	528	400	286	310	274	188	198	154
27	2,210	854	543	710	498	374	298	310	274	188	198	162
28	2,030	854	543	678	484	374	274	298	298	188	198	154
29	1,790	838	528	678	470	374	274	298	298	179	198	146
30	1,570	790	513	678	.....	361	274	618	286	198	188	146
31	1,640	.....	513	678	.....	361	.....	361	.....	188	188	.....

NOTE.—Gage heights partly estimated on Sept. 18, 24, and 25, 1919, account of water overtopping gage.

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Monthly discharge of San Antonio River at Calaveras, Tex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	1,480	31	158	9,720
November	358	44	86.9	5,170
December	1,410	42	190	11,700
January	7,420	53	473	29,100
February	215	84	105	5,830
March	300	60	89	5,470
April	2,120	64	223	13,600
May	1,020	85	224	13,800
June	3,370	64	301	17,900
July	3,380	102	536	33,000
August	809	113	202	12,400
September	13,200	108	3,630	216,000
The year	13,200	31	516	374,000
1919-20.				
October	9,170	1,570	3,870	238,000
November	2,680	790	1,270	75,600
December	838	513	658	40,500
January	1,600	484	750	46,100
February	838	470	610	35,160
March	543	361	418	25,700
April	456	274	332	19,800
May	1,940	251	411	25,300
June	710	240	354	21,100
July	274	179	217	13,300
August	387	188	222	13,600
September	198	146	166	9,880
The year	9,170	146	777	564,000

SAN PEDRO CREEK AT SAN ANTONIO, TEX.

LOCATION.—At Commerce Street Bridge, 1½ blocks west of courthouse in San Antonio, Bexar County, 1½ miles above mouth of Salsamora and Martinez creeks, 1½ miles below San Pedro Springs, source of creek, and 3 miles above confluence with San Antonio River.

DRAINAGE AREA.—Indeterminate.

RECORDS AVAILABLE.—July 20, 1916, to September 30, 1920.

GAGE.—Vertical staff, attached to wall of building No. 713 Commerce Street, on upstream side of bridge on left bank; read by G. H. Cumberland.

DISCHARGE MEASUREMENTS.—Made by wading below gage.

CHANNEL AND CONTROL.—Bed composed of rock, gravel, and mud; shifting. Channel straight above and below station. Banks formed by walls of buildings. City improvements have confined the stream to a small channel during low and medium stages, but during floods the streets are covered with water for several blocks. A shoal subject to shift, about 100 feet below gage, serves as control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 4.45 feet at 8.20 a. m., September 15 (discharge, 335 second-feet, determined by extension of rating curve); minimum discharge, 0.7 second-feet December 10-11.

Maximum stage recorded during year ending September 30, 1920, 3.4 feet October 16 (determined from marks on gage; discharge not determined); minimum discharge 8.2 second-feet, September 5-18.

1916-1920: Maximum stage recorded, 6.25 feet at 7.40 a. m. September 25, 1916 (discharge not determined); minimum discharge, 0.7 second-foot December 10-11, 1918.

ICE.—None.

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DIVERSIONS.—None.

REGULATION.—No dams, reservoirs, or controlling works that permanently regulate the flow.

ACCURACY.—Stage-discharge relation not permenent. Rating curve poorly defined for all stages. Gage read to hundredths twice daily, but mean of two readings daily during flood stages may not be true mean, owing to rapid fluctuations. Daily discharge ascertained by indirect method for shifting control, but record for 1920 not deemed sufficiently accurate to be published. Records poor.

Entire flow of San Pedro Creek, except during times of heavy precipitation, is furnished by San Pedro Springs, and the flow at this station is believed to be that which reaches San Antonio River. Martinez and Salsamora creeks carry no water except during heavy local rains, and have been known to be dry for several years at a time.

Discharge measurements of San Pedro Creek at San Antonio, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Oct. 12	McCashin and Congdon	1.30	2.8	Jan. 22	Ellsworth and Pritchett	1.74	11.8
Nov. 29	E. P. Congdon	1.58	3.6	Feb. 1	D. A. Dudley	1.74	14.3
				19	C. E. Ellsworth	1.68	13.6
1919.				Mar. 10	McCashin and Pritchett	1.68	12.8
Jan. 25	A. K. Gowans	1.39	6.0	Apr. 8	C. E. Ellsworth	1.71	12.9
Feb. 3	Ellsworth and Congdon	1.40	6.0	May 7	D. A. Dudley	1.68	12.6
Mar. 12	E. P. Congdon	1.38	4.2	June 27	T. Twichell	1.69	11.1
Apr. 17	Ellsworth and Quarles	1.40	6.7	July 11	C. E. Ellsworth	1.65	9.7
May 14	C. E. Ellsworth	1.44	6.9	30	T. Twichell	1.60	10.3
July 21	Dudley and Twichell	2.32	52.0	Sept. 7	McCashin and West	1.64	8.74
Sept. 3	D. A. Dudley	1.48	8.6				
Dec. 17	C. E. Ellsworth	1.67	13.5				
30	Ellsworth and Pritchett	1.67	12.1				

Daily discharge, in second-feet, of San Pedro Creek at San Antonio, Tex., for the year ending Sept. 30, 1919.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.8	3.0	4.1	2.7	6.4	5.0	5.6	7.9	7.9	7.6	13	8.5
2	2.8	3.3	3.3	2.7	6.6	5.0	13	7.7	7.9	18	14	8.5
3	2.8	3.1	3.7	2.7	7.4	5.0	8.5	7.4	7.9	7.4	13	8.5
4	2.8	3.3	3.3	2.7	6.4	5.0	6.4	6.6	7.9	7.4	14	8.5
5	2.8	3.7	.9	2.8	6.2	5.0	6.4	6.6	7.9	7.4	14	8.5
6	2.8	3.7	.8	2.8	5.9	5.0	6.4	7.9	7.9	52	15	8.5
7	2.8	3.5	.9	3.0	5.9	5.0	6.4	7.9	7.9	7.6	15	8.5
8	2.8	3.9	.9	2.8	5.6	5.0	6.6	7.4	7.9	7.4	16	9.6
9	2.8	3.7	.8	3.0	5.9	5.0	6.4	6.6	17	7.4	16	8.5
10	3.5	3.9	.6	3.0	5.6	5.0	6.4	6.6	7.9	7.4	16	8.5
11	3.0	3.5	.7	3.1	5.9	5.0	6.6	41	7.9	7.4	16	8.2
12	2.8	3.7	.9	3.1	5.6	5.0	6.6	6.9	7.9	7.4	16	8.2
13	2.8	3.5	1.1	3.5	5.6	4.8	6.4	6.9	7.9	7.9	16	8.5
14	2.8	6.9	.8	13	5.6	4.8	6.6	6.9	7.9	7.6	16	20
15	2.8	3.7	.9	4.1	5.6	4.8	6.6	6.9	7.9	7.6	16	144
16	3.0	3.1	.9	3.9	5.6	5.0	6.4	6.9	8.5	7.9	16	19
17	3.0	3.3	1.0	3.9	5.6	5.0	6.4	11	9.4	7.9	15	19
18	3.0	3.7	3.7	3.7	5.6	5.0	6.4	7.4	8.5	8.2	13	11
19	3.0	3.7	34	4.4	5.4	5.0	6.4	7.4	7.9	8.5	12	10
20	3.0	3.9	1.5	4.8	5.9	5.0	6.4	7.4	7.9	8.5	12	10
21	3.1	3.7	1.4	4.8	5.2	5.0	6.2	7.4	8.5	44	48	10
22	10	5.4	1.3	5.4	5.2	5.2	6.2	7.4	8.5	48	13	14
23	3.0	4.8	20	46	5.2	5.4	6.2	7.4	11	72	9.6	13
24	3.0	4.6	1.7	6.4	5.2	5.6	6.2	21	11	18	9.4	12
25	4.4	4.6	1.7	5.6	5.2	36	6.2	7.4	12	15	9.1	12
26	6.2	4.4	1.9	6.2	5.2	6.6	5.9	7.4	79	12	8.8	12
27	3.1	3.9	2.0	48	5.2	5.6	5.9	7.2	88	14	8.8	12
28	2.8	3.7	2.0	7.6	5.2	5.4	5.9	7.2	9.4	13	8.5	12
29	3.0	3.5	2.3	6.2	.....	5.4	134	7.4	8.5	13	8.5	12
30	2.8	3.7	2.3	6.6	.....	5.4	40	7.9	9.9	13	8.5	12
31	2.8	.....	2.5	6.2	.....	5.4	.....	7.9	.....	13	8.5	.....

NOTE.—Daily discharge determined by indirect method for shifting control during following periods: Oct. 1 to Feb. 15, Feb. 21 to Mar. 25, Apr. 1 to June 26. Aug. 22 to Sept. 14.

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Monthly discharge of San Pedro Creek at San Antonio, Tex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	10	2.8	3.29	202
November	6.9	3.0	3.88	231
December	34	.6	3.35	206
January	48	2.7	7.25	446
February	7.4	5.2	5.71	317
March	36	4.8	6.14	378
April	134	5.6	12.0	714
May	41	6.6	8.93	549
June	88	7.9	13.9	827
July	72	7.4	15.6	959
August	48	8.5	14.0	861
September	144	8.2	15.5	922
The year	144	.6	9.13	6,610
1919-20.				
October	.....	12	22.7	1,400
November	.....	16	18.2	1,080
December	20	13	14.6	898
January	31	10	12.6	775
February	15	13	13.7	788
March	14	13	13.1	806
April	26	13	15.0	893
May	18	12	13.5	830
June	20	10	11.6	690
July	10	9.4	9.84	605
August	21	9.4	10.9	670
September	9.9	8.2	8.65	515
The year	.....	8.2	13.7	9,950

NUECES RIVER BASIN.

NUECES RIVER NEAR CINONIA, TEX.

LOCATION.—Just below suspension highway bridge near Oswald ranch, 2 miles east of Cinonia, Zavalla County, 8 miles northeast of Crystal City, and 20 miles above Winter Garden ranch dam.

DRAINAGE AREA.—2,060 square miles (measured on standard topographic maps; post-route map; and topographic map of Texas, compiled in 1899 by Robert T. Hill, of the United States Geological Survey; scale, 1 inch=25 miles).

RECORDS AVAILABLE.—July 5, 1915, to September 30, 1920.

GAGE.—Vertical staff in six sections, installed May 6, 1918, on right bank, 200 feet below highway bridge; read by C. C. Oswald. From July 5, 1915, to September 23, 1917, gage used was vertical staff in seven sections on right and left banks. September 24, 1917, to May 5, 1918, Dexter water-stage recorder near concrete control. All gages set at same datum and at approximately the same location.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading on crest of concrete control.

CHANNEL AND CONTROL.—Bed composed of clay and gravel; free from vegetation; subject to shift prior to September 23, 1917. Banks high and wooded, and not subject to overflow, except during extremely high water. Channel straight above and below station. An artificial concrete control was completed at the site of the gage on September 23, 1917; point of zero flow, 0.85 foot. The stage-discharge relation has been seriously affected at times prior to installation of artificial control by collecting of logs, leaves, and brush below gage.

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[illegible]—Maximum stage recorded during year ending September [illegible] feet September 23, determined by levelling from flood marks (discharge [illegible]); no flow October 1–10.

[illegible] stage recorded during year ending September 30, 1920, 26.3 feet at [illegible] October 17 (discharge, 4,190 second-feet, determined from extension of [illegible]); minimum stage, 1.40 feet September 14–30 (discharge, 11 second-feet).

[illegible]—Maximum stage recorded in 1919 (see above). According to local [illegible] the greatest flood of record occurred in 1913 when the river reached a [illegible] feet on present gage. No flow during periods in 1917 and 1918.

[illegible]—None.

[illegible]—Considerable water diverted above station for irrigation; amount not known.

[illegible]—None.

[illegible]—Stage-discharge relation permanent. Rating curve well defined below 700 second-feet; above 700 second-feet, extended by use of velocity-area curves, and subject to error. Gage read to half-tenths twice daily. Daily discharge determined by applying mean daily gage height to rating table. Records good for low and medium stages.

[illegible] from a dam 40 feet high, about 20 miles below station extends within 2 [illegible] of station when reservoir is full. A large part of the flow of the river is known [illegible] into the bed just below Uvalde and return to the surface just above the station. The condition of the underground water may have an effect on this return water and [illegible] equalize the flow.

Discharge measurements of Nueces River near Cline, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
[illegible]	McNabb and Congdon	6.46	379	May 10	C. E. Ellsworth	1.26	3.0
[illegible]	do	6.11	322	Aug. 27	D. A. Dudley	9.23	626
[illegible]	do	5.49	268				
[illegible]	do	2.54	77.2	1920.			
				Jan. 30	D. A. Dudley	4.10	161
				May 12	do	1.85	29.9
				July 16	C. E. Ellsworth	1.62	18.9

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Daily discharge, in second-feet, of Nueces River near Cinonia, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	0	2.4	2.2	5.0	14	7.2	7.2	5.4	14	22	15	253
2	0	1.9	2.2	5.0	13	7.2	59	5.0	14	55	14	229
3	0	1.9	1.9	4.4	11	6.4	97	5.0	14	90	14	205
4	0	1.9	1.9	4.4	33	6.4	48	5.0	13	92	12	181
5	0	1.9	1.9	4.4	53	6.4	30	6.8	11	92	11	157
6	0	1.9	1.9	4.4	32	6.4	18	6.1	9.4	59	10	133
7	0	256	2.2	4.4	17	6.4	16	5.7	7.2	48	10	109
8	0	28	2.2	4.4	14	6.4	14	5.7	7.2	40	9.4	97
9	0	15	2.2	4.4	14	6.4	12	5.7	7.2	53	8.9	85
10	0	11	2.1	4.4	14	6.4	8.4	5.0	6.8	50	8.0	73
11	.8	5.7	1.9	4.4	14	6.4	7.2	5.0	6.4	32	8.0	61
12	58	3.0	1.9	4.4	11	6.4	7.2	5.0	5.7	29	8.0	55
13	25	2.4	13	4.4	8.9	6.4	7.2	5.0	5.7	26	7.2	51
14	10	2.2	24	4.4	8.0	6.4	7.2	4.7	5.7	24	7.2	44
15	2.8	2.2	10	4.7	8.0	6.4	6.4	4.4	5.4	20	7.2	434
16	1.1	2.2	5.0	6.4	7.2	6.4	6.4	6.8	5.0	17	7.2	1,970
17	.4	1.9	3.2	6.4	15	5.7	6.1	11	4.7	15	6.4	3,850
18	.4	1.9	2.8	5.7	14	5.7	5.7	7.6	8.0	14	6.1	3,250
19	.4	1.6	18	5.7	13	5.7	5.7	6.4	8.4	12	5.7	1,470
20	.3	1.6	133	5.0	9.4	5.7	5.7	5.0	6.8	9.4	5.0	935
21	.3	1.6	74	5.4	8.0	5.7	5.7	4.4	5.7	10	5.0	688
22	1,960	1.6	14	2,730	7.2	5.7	5.7	4.2	4.4	18	5.0	637
23	455	1.6	128	296	7.2	5.7	5.7	3.2	46	36	742	.....
24	61	2.1	94	53	7.2	5.7	5.7	488	71	91	2,400	.....
25	46	2.6	21	28	7.2	6.4	5.7	816	61	94	1,250	.....
26	23	2.6	11	22	7.2	8.9	5.7	194	66	153	829	.....
27	10	2.6	8.4	28	7.2	29	5.0	53	70	77	620	.....
28	7.6	2.6	7.2	76	7.2	22	5.0	30	28	68	463	3,160
29	5.4	2.6	7.2	28	.....	17	5.0	21	21	42	388	2,290
30	4.2	2.6	6.8	18	.....	13	5.7	17	16	28	330	1,770
31	3.2	.....	5.7	15	.....	7.6	.....	14	.....	17	280	.....
1919-20.												
1	1,450	615	348	180	159	106	70	33	33	26	15	17
2	1,200	582	296	180	159	103	70	38	33	26	15	17
3	1,090	560	296	180	159	100	64	38	33	26	15	16
4	1,000	549	288	180	152	100	64	33	30	23	15	15
5	921	538	280	173	152	100	64	33	36	23	14	15
6	949	498	280	173	145	100	64	33	38	23	13	15
7	949	582	272	173	145	94	64	30	37	23	13	15
8	949	518	272	173	145	94	64	28	34	21	13	15
9	1,090	478	264	166	138	94	64	28	33	21	18	13
10	1,050	468	264	166	138	94	64	28	32	21	18	13
11	1,000	458	256	166	131	94	58	28	30	21	16	13
12	963	438	248	173	131	88	58	30	28	21	15	13
13	842	420	248	180	131	88	58	30	32	21	13	13
14	790	420	240	187	124	88	58	30	33	20	152	12
15	754	402	232	187	124	88	53	33	32	19	131	11
16	1,000	402	232	194	124	85	53	30	30	19	28	11
17	3,600	384	224	194	118	82	53	30	29	19	19	11
18	3,120	384	224	187	118	82	53	30	28	19	19	11
19	1,910	366	224	187	118	79	53	30	28	19	19	11
20	1,450	366	224	180	118	76	53	30	29	17	19	11
21	1,120	357	232	173	112	76	43	30	34	17	19	11
22	977	357	232	173	112	73	43	30	33	17	17	11
23	935	348	224	173	112	70	43	33	30	17	17	11
24	855	348	216	173	112	70	38	33	30	17	17	11
25	829	330	216	187	112	73	38	33	28	17	17	11
26	766	330	201	180	106	79	43	33	28	16	17	11
27	718	312	201	180	106	76	38	33	27	15	17	11
28	694	312	194	173	106	76	38	33	26	15	17	11
29	1,350	312	194	173	106	70	33	33	26	15	15	11
30	730	312	187	166	.....	70	33	33	26	15	15	11
31	637	.....	187	166	.....	70	.....	33	.....	15	15	.....

NOTE.—No record, Dec. 21, 1918, and Sept. 1-6, 1919; discharge interpolated. No record Sept. 23-27, 1919, during which period floods occurred making it impractical to estimate discharge. Discharge above 700 second-feet determined from extension of rating curve and subject to considerable error.

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Monthly discharge of Nueces River near Cinonia, Tex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	1,960	0	86.3	5,310
November	256	1.6	12.3	732
December	133	1.9	19.7	1,210
January	2,730	4.4	110	6,760
February	53	7.2	13.6	755
March	29	5.7	8.18	503
April	97	5.0	14.3	851
May	816	3.2	56.8	3,490
June	71	4.4	18.5	1,100
July	153	9.4	46.2	2,840
August	2,400	5.0	242	14,900
September 1-22	3,850	44	680	29,700
The period				68,200
1919–20.				
October	3,600	637	1,150	70,700
November	615	312	425	25,300
December	348	187	242	14,900
January	194	166	177	10,900
February	159	106	128	7,360
March	106	70	85.1	5,230
April	70	33	53.1	3,160
May	38	28	31.6	1,940
June	38	26	30.9	1,840
July	26	15	19.5	1,200
August	152	13	26.6	1,510
September	17	11	12.6	750
The year	3,600	11	200	145,000

NUECES RIVER NEAR THREE RIVERS, TEX.

LOCATION.—At San Antonio, Uvalde & Gulf Railroad bridge 1 mile west of Kittie, 2 miles southeast of Three Rivers, Live Oak County, and half a mile below mouth of Frio River.

DRAINAGE AREA.—15,600 square miles (measured on standard topographic maps; post-route map; and topographic map of Texas, compiled in 1899 by Robert T. Hill, of the United States Geological Survey; scale, 1 inch=25 miles).

RECORDS AVAILABLE.—July 1, 1915, to September 30, 1920.

GAGE.—Vertical staff in four sections, attached to piers of railroad bridge; read by C. L. McMahon, T. H. Hammon, J. B. Mouser, and M. C. Mouser.

DISCHARGE MEASUREMENTS.—Made by wading near gage or from highway bridge half a mile below gage.

CHANNEL AND CONTROL.—Bed composed of adobe shale; does not change greatly. Channel straight above and below station. Banks wooded, high, and not subject to overflow, except at extremely high stages. Position of high-water control not known; shoal just below gage probably forms low-water control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 46.0 feet at 5 a. m. September 18 (discharge not determined); backwater probably due to Gulf storm; minimum stage, 0.35 foot December 8–12 (discharge, 2.2 second-feet).

Maximum stage recorded during year ending September 30, 1920, 36.1 feet during morning of October 19 (discharge, 13,600 second-feet, determined from extension of rating curve); minimum stage, 1.4 feet at 9 a. m. September 29 and 8.30 a. m. September 30 (discharge, 22 second-feet).

1915–1920: Maximum stage recorded in 1919 (see above); no flow during several periods of record.

ICE.—None.

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DIVERSIONS.—Records of the Board of Water Engineers for the State of Texas show that about 10,000 acres have been declared irrigated by diversions from the stream above the station.

REGULATION.—None of consequence.

ACCURACY.—Stage-discharge relation not permanent. Rating curve well defined below 7,000 second-feet; above this point extended by use of area-velocity curves and subject to error. Gage read to tenths twice daily from October 1, 1918, to September 30, 1919, and once daily thereafter. Daily discharge determined by applying mean daily gage height to rating table to October 23, 1919, and by indirect method for shifting control for remainder of period. Records fair.

Discharge measurements of Nueces River near Three Rivers, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height	Discharge.
1918.		*Ft.*	*Sec.-ft.*			*Ft.*	*Sec.-ft.*
Oct. 28	McCashin and Congdon.	16.79	4,160	Sept. 1	D. A. Dudley	24.95	7,100
28	do	16.21	3,970				
29	do	12.57	2,860	1920.			
Dec. 21	E. P. Congdon	27.14	6,270	Jan. 31	do	3.51	296
22	do	14.34	2,820	Mar. 13	McCashin and Pritchett	2.44	141
				May 9	D. A. Dudley	3.02	252
1919.				June 26	T. Twichell	1.85	67.1
May 11	C. E. Ellsworth	10.60	2,200	Sept. 10	McCashin and West	2.30	87.3
12	do	14.66	3,570				

Daily discharge, in second-feet, of Nueces River near Three Rivers, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	38	4,110	4.2	647	1,440	31	2,850	6,120	1,770	3,260	3,630	8,380
2	24	4,970	4.2	476	1,500	28	2,710	2,750	1,260	3,040	2,330	3,180
3	30	5,950	4.2	355	1,520	28	6,720	1,380	1,280	3,400	2,260	1,640
4	18	7,100	4.2	278	1,740	28	8,850	1,230	1,360	4,350	1,950	1,760
5	15	5,500	4.2	158	3,550	28	5,680	1,230	2,330	4,250	1,840	1,470
6	14	3,690	4.2	100	2,850	28	2,820	1,230	2,840	3,450	1,700	1,330
7	14	4,370	4.2	88	1,980	28	2,260	1,650	2,610	4,690	1,760	1,200
8	15	1,940	2.4	56	1,180	42	1,960	3,490	2,610	6,260	1,820	1,080
9	15	1,430	2.4	34	993	31	1,890	2,240	2,990	3,240	1,880	950
10	81	446	2.4	26	896	24	2,380	2,020	3,220	1,900	1,960	824
11	702	81	2.4	24	836	24	2,590	2,070	3,690	1,660	1,580	.....
12	2,990	16	2.4	24	616	24	2,470	3,910	3,530	1,640	556	.....
13	1,680	14	31	20	546	24	2,120	4,270	2,990	1,830	346	.....
14	616	12	920	20	436	20	1,760	3,360	2,280	2,160	189	.....
15	596	2,850	304	16	278	20	1,620	2,610	1,610	1,250	142	.....
16	702	1,640	28	16	245	20	1,700	2,360	1,320	848	114	.....
17	920	998	18	100	221	16	1,720	3,220	1,260	658	100	.....
18	596	1,190	418	42	197	14	1,450	3,890	1,200	526	88	.....
19	427	1,960	8,720	28	165	14	860	801	556	436	74	.....
20	237	1,960	11,800	24	150	14	418	626	253	355	62	.....
21	173	1,740	9,820	16	142	14	128	779	320	229	304	.....
22	2,850	1,180	2,790	2,570	128	14	74	896	658	691	3,450	.....
23	8,520	436	3,150	7,520	114	14	74	993	1,760	1,070	2,250	.....
24	9,780	100	5,760	7,620	100	14	74	1,060	1,770	3,710	790	.....
25	6,560	42	6,680	2,540	88	4,110	62	2,180	2,330	5,990	476	.....
26	3,130	20	2,800	2,250	68	11,000	52	2,570	6,820	7,520	836	.....
27	5,190	11	1,260	3,650	47	14,400	42	932	7,860	5,160	1,500	.....
28	4,650	6.2	1,590	4,050	38	13,500	34	691	4,590	3,490	2,660	.....
29	3,000	6.2	1,840	2,060	.....	11,500	62	956	2,680	5,170	4,710	.....
30	2,140	6.2	1,300	1,410	.....	7,120	3,650	1,470	2,560	5,290	6,960	.....
31	2,800	.....	566	896	.....	3,340	.....	1,660	.....	5,320	7,910	.....

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Daily discharge, in second-feet, of Nueces River near Three Rivers, Tex., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	11,600	.....	.....	.....	295	197	94	47	546	62	213	270
2	9,850	.....	.....	.....	295	181	94	68	409	42	121	189
3	9,100	.....	.....	.....	295	181	94	81	253	34	81	128
4	8,400	.....	.....	.....	278	181	94	181	546	28	68	100
5	7,910	.....	.....	.....	278	165	81	107	526	6,540	57	88
6	8,550	.....	.....	.....	278	165	81	94	526	9,650	57	74
7	10,800	.....	.....	.....	278	165	81	68	824	7,190	150	74
8	11,600	.....	.....	.....	278	150	81	128	669	6,120	229	74
9	10,800	.....	.....	.....	278	150	68	213	526	4,550	229	100
10	9,350	.....	.....	.....	261	150	81	616	270	2,900	346	88
11	7,670	.....	.....	.....	261	150	68	312	173	1,860	81	88
12	6,450	.....	.....	.....	261	150	81	329	128	1,680	81	62
13	6,580	.....	.....	.....	956	135	81	229	100	1,590	81	62
14	7,620	.....	.....	.....	556	135	68	278	88	586	150	82
15	9,250	.....	.....	.....	346	135	68	229	626	245	418	52
16	11,400	.....	.....	.....	312	135	68	2,980	1,230	181	213	47
17	12,400	.....	.....	.....	278	135	57	2,760	205	150	181	47
18	13,200	.....	.....	.....	278	135	57	944	114	135	278	38
19	13,500	.....	.....	.....	261	135	57	566	74	121	476	38
20	12,600	.....	.....	.....	261	121	57	896	74	94	436	31
21	11,200	.....	.....	.....	245	121	47	1,180	62	81	436	34
22	10,400	.....	.....	.....	245	121	47	920	62	81	476	28
23	10,600	.....	.....	.....	245	121	47	506	253	68	536	28
24	.....	.....	.....	.....	229	121	47	221	205	68	616	62
25	.....	.....	.....	.....	213	121	47	189	128	57	702	62
26	.....	.....	.....	.....	213	121	57	173	74	57	1,240	47
27	.....	.....	.....	.....	197	107	94	158	100	57	1,110	31
28	.....	.....	.....	.....	197	107	68	158	100	47	1,140	26
29	.....	.....	.....	.....	197	107	68	286	74	47	1,260	22
30	.....	.....	.....	.....	.....	94	47	526	52	47	1,480	22
31	.....	.....	.....	.....	.....	94	.....	355	.....	38	1,260	.....

NOTE.—Discharge interpolated Sept. 7–9, 1919. No record Sept. 11–14, and 19–30, 1919. Medium to high stages prevailed during those periods. Sept. 15, 16, 17, and 18, 1919, mean daily gage heights, 30.05, 37.5, 43.0, and 46.0 feet, respectively; probably affected by backwater caused by high winds from Gulf storm. No record Oct. 24, 1919, to Jan. 31, 1920.

Monthly discharge of Nueces River near Three Rivers, Tex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	9,780	14	1,890	116,000
November	7,100	6.2	1,790	107,000
December	11,800	2.4	1,930	119,000
January	7,620	16	1,200	73,800
February	3,550	38	788	43,800
March	14,400	14	2,110	130,000
April	8,850	34	1,970	117,000
May	6,120	626	2,090	129,000
June	7,860	253	2,410	143,000
July	7,520	229	2,990	184,000
August	7,910	62	1,810	111,000
September 1-10	8,380	824	2,180	43,300
The period	.....	.....	.....	1,320,000
1919-20.				
October 1-23	13,500	6,450	10,000	456,000
February	956	197	295	17,000
March	197	94	138	8,480
April	94	47	69.3	4,120
May	2,980	47	510	31,400
June	1,230	52	301	17,900
July	9,650	28	1,430	87,900
August	1,480	57	458	28,200
September	270	22	68.8	4,090

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NUECES RIVER AT CALALLEN, TEX.

LOCATION.—At old pump house for city of Corpus Christi, half a mile northwest of Calallen, Nueces County, 18 miles west of Corpus Christi, 8 miles above Nueces Bay, and half a mile above edge of tidewater and breakwater dam.

DRAINAGE AREA.—16,700 square miles (measured on post-route map and topographic map of Texas, compiled in 1899 by Robert T. Hill, of the United States Geological Survey; scale, 1 inch=25 miles).

RECORDS AVAILABLE.—August 12, 1915, to September 30, 1920.

GAGE.—Vertical staff attached to pipe-line support of old pump house; read by Henry Wagner or John Cunningham.

DISCHARGE MEASUREMENTS.—Made by wading at the breakwater or from cable 125 feet below gage.

CHANNEL AND CONTROL.—Bed composed of clay and gravel. Channel straight above and below station. Left bank wooded, low, and bordered by levee constructed to prevent overflow; right bank wooded, medium in height, and not subject to overflow. The breakwater dam which is a loose rock fill half a mile below, serves as control. It leaks badly and is subject to change during floods. Flood damage is repaired by dumping loose rock on the crest.

EXTREMES OF STAGE.—Maximum stage during year ending September 30, 1919, 12 feet in September; minimum stage, 1.80 feet October 9 and March 16–24.

Maximum stage recorded during year ending September 30, 1920, 7.1 feet at 4 p. m. July 12; minimum stage, 1.60 feet 4 p. m. September 24 to 8 a. m. September 27.

1915–1920: During September, 1919, the river reached a stage of about 12 feet, as determined from flood marks on the gage: This was not only the highest stage reached during the period covered by records but probably exceeds any that occurred for many years prior to the establishment of this station. Discharge indeterminate because of lowlands on left bank overflowing for a width of several miles. No flow August 23–28, 1918.

ICE.—None.

DIVERSIONS.—Considerable water taken from river for irrigation immediately above station, and river water is also used for irrigation throughout the drainage above. The city of Corpus Christi pumps water just below the gage for municipal supply. They reported a consumption of 922 acre-feet during 1918.

REGULATION.—None of consequence.

ACCURACY.—Stage-discharge relation not permanent because of leakage through and repair of the breakwater dam. Rating curve is poorly defined, Gage read to hundredths twice daily. Daily discharge not computed because of changing control and insufficient discharge measurements. Records poor.

The following discharge measurement was made by C. E. Ellsworth:

April 16, 1919: Gage height, 4.18 feet; discharge, 2,000 second-feet.

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Daily gage height, in feet, of Nueces River at Calallen, Tex., for the periods, Oct. 1, 1918, to Mar. 31, 1919, and Apr. 1 to Sept 30, 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.							1920.						
1	2.65	7.18	2.15	3.67	4.10	2.05	1	2.20	2.05	2.30	2.05	2.05	3.50
2	2.32	6.55	2.10	3.15	3.70	2.00	2	2.20	2.05	2.45	2.00	1.95	3.20
3	2.12	5.95	2.00	2.97	3.60	2.00	3	2.20	2.05	2.55	2.00	1.85	2.40
4	1.98	6.15	2.00	2.65	3.82	1.95	4	2.20	2.10	2.55	2.00	1.90	2.25
5	1.95	6.55	2.00	2.60	4.22	1.90	5	2.20	2.10	2.40	2.00	1.90	2.18
6	1.90	6.90	1.92	2.55	4.45	1.90	6	2.15	2.20	2.60	2.25	1.85	2.02
7	1.88	7.20	1.95	2.45	4.85	1.90	7	2.10	2.20	2.60	4.12	1.80	1.92
8	1.85	7.40	1.95	2.32	4.25	1.90	8	2.18	2.20	2.70	4.60	1.80	1.88
9	1.80	6.85	1.95	2.25	3.85	1.85	9	2.20	2.40	2.85	5.20	1.80	1.82
10	1.88	6.00	1.95	2.20	3.60	1.85	10	2.20	2.25	2.85	5.95	1.80	1.80
11	1.98	4.70	1.95	2.17	3.15	1.85	11	2.20	2.20	2.65	6.70	2.00	1.82
12	2.30	3.00	1.95	2.15	2.95	1.85	12	2.20	2.55	2.45	7.05	2.10	1.90
13	3.25	2.55	1.95	2.10	2.90	1.85	13	2.20	2.62	2.35	6.65	2.10	1.88
14	4.20	2.40	1.90	2.10	2.85	1.85	14	2.20	2.60	2.15	5.70	2.05	1.85
15	3.75	2.75	2.10	2.10	2.75	1.82	15	2.20	2.50	2.00	3.85	2.00	1.85
16	2.95	3.12	2.70	2.10	2.60	1.80	16	2.20	2.62	2.05	2.80	2.15	1.80
17	2.85	3.30	2.65	2.22	2.50	1.80	17	2.10	3.85	2.50	2.40	2.20	1.78
18	2.80	3.30	2.70	2.35	2.42	1.80	18	2.10	4.05	3.10	2.25	2.20	1.72
19	3.15	3.30	3.50	2.50	2.35	1.80	19	2.10	4.30	3.65	2.10	2.20	1.70
10	2.90	3.60	4.35	2.50	2.35	1.80	20	2.05	3.70	2.15	2.10	2.10	1.70
21	2.85	3.95	5.35	2.72	2.30	1.80	21	2.05	2.95	2.00	2.00	2.25	1.65
22	2.82	4.30	6.90	2.95	2.30	1.80	22	2.00	3.10	1.98	2.00	2.45	1.65
23	3.30	3.95	7.65	3.80	2.20	1.80	23	2.00	3.35	1.90	2.00	2.45	1.65
24	4.62	3.60	8.30	4.70	2.17	1.80	24	2.00	3.25	1.90	2.00	2.50	1.62
25	5.30	3.00	8.40	6.00	2.15	2.30	25	2.00	2.70	2.00	2.00	2.62	1.60
26	6.05	2.52	8.10	6.90	2.10	3.15	26	2.05	2.35	2.10	2.10	2.82	1.60
27	6.85	2.35	7.88	7.25	2.05	4.25	27	2.00	2.25	2.20	1.98	3.05	1.62
28	7.42	2.22	6.80	6.70	2.00	5.15	28	2.00	2.20	2.10	1.95	3.12	1.65
29	7.85	2.20	5.75	6.20	.....	6.60	29	2.00	2.20	2.00	1.72	3.15	1.72
30	7.75	2.20	5.10	6.20	.....	7.35	30	2.10	2.20	2.00	1.70	3.25	1.68
31	7.68	.....	4.35	5.65	.....	8.60	31	.....	2.20	.....	2.02	3.40	.....

NOTE.—No gage-height record Apr. 1, 1919, to Mar. 31, 1920.

FRIO RIVER NEAR DERBY, TEX.

LOCATION.—At International & Great Northern Railway bridge 900 feet below mouth of Leona River, 400 feet below highway bridge, and 4 miles south of Derby, Frio County.

DRAINAGE AREA.—3,500 square miles (measured on post-route map; and topographic map of Texas, compiled in 1899 by Robert T. Hill, of the United States Geological Survey; scale, 1 inch=25 miles).

RECORDS AVAILABLE.—August 1, 1915, to September 30, 1920

GAGE.—Vertical staff attached to railway bridge pier; read by John A. Head and E. L. Willingham.

DISCHARGE MEASUREMENTS.—Made from railway bridge or highway bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of rock, sand, and gravel; channel curved above and below station, but straight at gage for 150 feet. Banks wooded, high, and not subject to overflow. A concrete dam, 50 feet below gage, serves as control during low and medium stages; position of high-water control not known. Point of zero flow, gage height 0.07 foot, except when affected by moss on control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 18.5 feet September 18 (discharge not determined); no flow during several long periods.

Maximum stage recorded during year ending September 30, 1920, 10.3 feet October 19 (discharge, 4,180 second-feet, determined from extension of rating curve); no flow during several periods.

1915–1920: Maximum stage recorded, September 18, 1919 (discharge not determined); no flow during several periods of each year.

ICE.—None.

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DIVERSIONS.—Small areas are irrigated by diversion in the headwaters, but available information does not show that water is taken from the stream immediately above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent except when affected by moss on control. Rating curve well defined below 2,000 second-feet; extended above. Gage read twice daily to tenths from October 1, 1918, to November 6, 1919, and March 1 to September 30, 1920, and to hundredths twice daily from November 7, 1919, to February 29, 1920, and oftener during rapid fluctuations. Daily discharge ascertained by applying mean daily gage height to rating table except from June 12 to September 30, 1920, when indirect method for shifting control was used because of growth of moss on control. Discharge for extremely low periods from March 1 to September 30, 1920, subject to large error, owing to gage being read only to nearest tenth of a foot. Records good except as otherwise noted.

Discharge measurements of Frio River near Derby, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Ft.*	*Sec.-ft.*	1920.		*Ft.*	*Sec.-ft.*
Oct. 25	McCashin and Congdon.	5.08	1,520	Jan. 28	D. A. Dudley	0.97	102
27	do	.78	65.5	29	do	.96	92.4
1919.				May 11	do	.56	35.3
May 10	C. E. Ellsworth	.33	11.3	July 16	C. E. Ellsworth	.19	1.1
Aug. 28	D. A. Dudley	5.74	1,870				

Daily discharge, in second-feet, of Frio River near Derby, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1		2.5		7.3	77		49	0.9	14	824	113	617
2		1.8		4.7	36		213	2.7	103	393	86	533
3		1.2		3.4	21		65	2.5	603	281	68	466
4		.3		2.0	19		233	2.0	1,030	292	57	393
5				1.6	23		118	2.7	152	206	52	344
6				1.4	62		107	1.6	49	194	46	298
7				1.2	175		54	160	22	162	39	257
8				.9	84		27	45	12	663	35	227
9				.9	41		16	20	6.0	2,710	30	199
10				.5	23		11	12	4.0	3,040	28	175
11	32			.5	14		6.0	6.7	2.5	900	24	155
12	162				8.6		2.7	4.7	1.8	502	21	138
13	680				4.0		1.6	2.5	1.4	379	21	122
14	312				2.7		1.2	298	.7	284	21	109
15	68			.3	2.7		.9	267	.5	227	21	418
16	32			1.4	2.7		.3	152	.5	191	18	1,580
17	16			1.4	4.0			722	1.4	155	16	
18	8.0			1.4	3.4			1,940	54	133	13	
19	2.7		774	.7	3.4			44	278	113	10	
20	1.6		3,220	.5	3.4			20	77	92	8.6	3,340
21	.5		2,540	.3	2.3			13	362	82	264	2,480
22	216		684	884	.9			12	477	248	802	1,740
23	2,260		400	3,550	.7			5.3	344	578	3,380	2,710
24	2,880		1,160	3,180	.5			7.3	284	2,280		3,740
25	1,720		2,130	1,080	.5	6.0		1,110	916	3,640		4,040
26	260		508	227	.3	1,170		2,540	1,550	2,740	3,580	3,340
27	52		186	103		856		1,700	1,830	1,990	2,540	3,040
28	22		77	964		554		1,330	2,780	960	1,790	2,710
29	16		41	872		210	1.8	194	3,340	603	1,340	2,360
30	8.0		22	435		105	4.0	51	3,140	267	980	2,170
31	2.7		15	162		55		25		168	725	

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Daily discharge, in second-feet, of Frio River near Derby, Tex., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1920.												
1	1,810	2,310	175	62	86	38	27	2.7	6.0	1.8	0	2.0
2	1,540	1,630	165	62	86	38	27	2.7	6.0	1.8	0	2.0
3	1,340	2,310	158	60	84	38	17	2.7	2.7	1.8	0	4.0
4	1,140	1,460	150	58	82	38	17	2.7	9.3	6.7	0	7.3
5	980	900	145	58	79	38	16	2.7	9.3	10	0	7.3
6	940	1,810	145	60	79	38	17	2.7	17	65	0	7.3
7	750	680	145	65	75	38	17	2.7	17	60	0	7.3
8	750	680	140	68	75	36	17	9.3	17	32	0	7.3
9	1,380	680	131	66	73	32	17	86	17	13	1.4	7.3
10	1,220	715	120	62	68	38	17	126	17	13	1.4	7.3
11	980	628	111	58	68	38	17	32	9.3	12	0	7.3
12	1,140	558	105	62	68	38	17	13	6.0	5.3	0	2.0
13	1,460	505	103	72	65	38	17	9.3	2.5	2.5	.3	2.0
14	980	470	101	84	65	38	13	9.3	2.5	1.4	251	2.0
15	980	435	99	94	65	38	9.3	1,140	2.5	1.4	109	2.0
16	1,060	418	96	88	62	38	9.3	1,760	2.5	1.4	81	7.3
17	1,380	400	88	82	62	38	9.3	418	2.5	1.4	55	4.0
18	3,360	382	90	77	62	27	9.3	116	2.5	1.4	35	4.0
19	4,020	348	92	72	60	27	9.3	60	8.6	.0	24	2.0
20	3,260	323	99	68	57	27	9.3	52	2.5	.0	15	4.0
21	2,760	306	101	66	55	27	9.3	32	8.0	.0	7.3	2.0
22	2,260	284	101	63	55	27	9.3	27	8.0	.0	7.3	2.0
23	1,940	270	99	60	54	27	13	17	2.3	.0	7.3	2.0
24	1,720	248	88	63	51	27	17	17	2.3	.0	7.3	.9
25	1,540	230	81	70	46	27	17	17	2.3	.0	4.0	.9
26	1,340	222	75	84	44	17	9.3	9.3	2.0	.0	7.3	.0
27	1,140	205	72	92	42	22	9.3	13	7.3	.0	4.0	.0
28	1,060	194	68	97	41	27	9.3	13	7.3	.0	2.0	.0
29	1,460	180	68	96	38	27	8.0	9.3	7.3	.0	2.0	2.0
30	2,560	180	65	92	.....	27	6.0	9.3	2.0	.0	2.0	2.0
31	2,080	.....	62	86	.....	27	.....	9.3	.....	.0	4.0	.....

NOTE.—No flow on days for which discharge is not given except on Aug. 24–25, and Sept. 17–19, 1919, when stage was above limit for which rating curve is defined. Mean daily gage heights, Aug. 24, 17.00 feet; Aug. 25, 13.10 feet; Sept. 17, 12.30 feet; Sept. 18, 16.83 feet; and Sept. 19, 1919, 11.05 feet. Discharge above 2,000 second-feet determined from extension of rating curve and subject to error.

Monthly discharge of Frio River near Derby, Tex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off (acre-feet).
	Maximum.	Minimum.	Mean.	
1918–19.				
October	2,880	0	282	17,300
November	2.5	0	.193	11.5
December	3,220	0	379	23,300
January	3,550	0	371	22,800
February	175	0	22.0	1,220
March	1,170	0	95.4	5,870
April	233	0	30.4	1,810
May	2,540	0	345	21,200
June	3,340	.5	581	34,600
July	3,640	82	816	50,200
The period	.....	.....	.....	178,000
1919–20.				
October	4,020	750	1,620	99,600
November	2,310	180	665	39,600
December	175	62	108	6,640
January	97	58	72.5	4,460
February	86	38	63.7	3,660
March	38	17	32.3	1,990
April	27	6.0	13.9	827
May	1,760	2.7	130	7,990
June	17	2.0	6.95	414
July	65	0	7.48	460
August	251	0	20.2	1,240
September	7.3	0	3.55	211
The year	4,020	0	230	167,000

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FRIO RIVER AT FOWLERTON, TEX.

LOCATION.—At Frio River dam, half a mile northeast of Fowlerton, LaSalle County, 1¼ miles below diversion for Frio Lake storage reservoir, and 8 miles below mouth of Jahuey Creek.

DRAINAGE AREA.—4,350 square miles (measured on post-route map, and topographic map of Texas, compiled in 1899 by Robert T. Hill, of the United States Geological Survey; scale, 1 inch=25 miles).

RECORDS AVAILABLE.—July 1, 1915, to August 30, 1919, when station was discontinued because break in levee above gage permitted water to flow around dam which served as control.

GAGE.—Vertical staff attached to tree on right bank 30 feet above dam; read by J. F. Martin and W. H. Newbury.

DISCHARGE MEASUREMENTS.—Made by wading below dam, or from railroad bridge a mile above.

CHANNEL AND CONTROL.—Channel straight for some distance above the station, but slightly curved below; banks about 5 feet high and not subject to overflow except during extremely high water; right bank cultivated; left bank wooded. Concrete dam about 30 feet below gage serves as permanent control at all stages, except when levees above dam were broken (see footnote to table of daily discharge). Point of zero flow, gage height 0.10 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 5.00 feet at 11 a. m. August 26 (discharge, 4,000 second-feet, determined from extension of rating curve. On August 27, 28, and September 14–20, stage was above 5 feet, but gage could not be reached because of high water. No flow for extended periods.

1915–1919: Maximum stage recorded in 1919 (see above); no flow during parts of each year.

ICE.—None.

DIVERSIONS.—Some water diverted for irrigation above station. A diversion for the Frio Lake reservoir is made 1½ miles above; other diversions are scattered; amount diverted and areas irrigated not known. A large part of the irrigated land in the drainage basin above the station is watered by wells.

REGULATION.—Flow regulated by the diversion into Frio Lake a short distance above gage; extent of regulation above Frio Lake diversion not known but probably small.

ACCURACY.—Stage-discharge relation permanent except for periods when break in levee permitted water to flow around end of dam which serves as control as noted in footnote to daily-discharge table. Rating curve fairly well defined below 1,600 second-feet, and extended above. Gage read to hundredths once daily. Daily discharge ascertained by applying mean daily gage height to rating table except as indicated in footnote to table of daily discharge. Records fair.

Discharge measurements of Frio River at Fowlerton, Tex., during the year ending Sept. 30, 1919.

Date.	Made by—	Gage height.	Dis. charge.	Date.	Made by—	Gage height.	Dis-charge.
		Ft.	*Sec.-ft.*			*Ft.*	*Sec.-ft.*
Oct. 25	McCashin and Congdon.	2.97	1,600	May 11	C. E. Ellsworth.....	0.30	12.1
27	.....do.....	1.33	348	Aug. 30	D. A. Dudley.....	1.29	[a] 897

[a] Water flowing around end of dam which ordinarily acts as control.

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Daily discharge, in second-feet, of Frio River at Fowlerton, Tex., for the year ending Sept. 30, 1919.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	0	.....	0	15	48	0	201	185	30	2,170	143
2	0	.....	0	8.4	10	0	150	117	1,110	2,070	88
3	0	.....	0	3.0	0	0	444	60	996	387	60
4	0	.....	0	2.4	0	0	365	26	325	306	44
5	0	.....	0	1.2	19	0	315	56	552	315	33
6	0	.....	0	0	6.6	0	185	48	398	297	26
7	0	.....	0	0	.....	0	100	37	74	193	20
8	0	.....	0	0	.....	0	52	26	30	130	18
9	0	.....	0	0	.....	0	20	20	12	270	15
10	0	.....	0	0	.....	0	8.4	15	3.0	852	15
11	56	.....	0	0	.....	0	3.0	15	1.2	1,540	12
12	78	.....	0	0	.....	0	1.8	15	0	1,500	10
13	105	.....	0	0	.....	0	1.8	12	0	420	8.4
14	100	.....	0	0	.....	0	1.8	10	0	315	8.4
15	94	.....	0	0	.....	0	1.2	10	0	234	6.6
16	52	.....	0	0	.....	0	0	185	0	157	6.6
17	0	.....	0	0	.....	0	0	178	0	117	4.8
18	0	.....	0	0	.....	0	0	164	0	88	3.0
19	0	.....	564	0	.....	0	0	528	0	69	2.4
20	0	.....	932	0	.....	0	0	325	143	60	1.8
21	0	.....	980	0	.....	0	0	164	164	69	1.2
22	868	.....	2,160	0	.....	0	0	64	178	69	.6
23	755	.....	1,100	1,590	0	0	0	10	243	456	288
24	642	0	600	1,840	0	0	0	88	325	712	564
25	1,500	0	387	2,270	0	1,640	0	117	468	1,080	2,270
26	1,420	0	432	1,200	0	2,100	0	315	852	1,840	3,980
27	365	0	528	225	0	860	0	614	1,200	2,560	.....
28	.....	0	137	52	0	570	0	1,040	1,320	2,550	.....
29	.....	0	83	30	.....	480	0	355	1,420	1,540	.....
30	.....	0	44	325	.....	193	0	150	1,840	740	897
31	.....	.....	23	201	.....	74	150	40	.....	243	.....

NOTE.—No record Oct. 23, 28–31, Nov. 1–23, Feb. 7–22, Aug. 27–29, and 31, and Sept. 1–30, caused principally by flood washing around end of dam which serves as control. Discharge interpolated, Oct. 23. On Aug. 27, 28, and Sept. 14–20 gage height exceeded 5 feet, but observer could not read gage on account of high water.

Monthly discharge of Frio River at Fowlerton, Tex., for the year ending Sept. 30. 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 1–27	.....	0	224	12,000
November 24–30	0	0	0	0
December	2,160	0	257	15,800
January	2,270	0	250	15,400
March	2,100	0	191	11,700
April	444	0	66.7	3,970
May	1,040	10	161	9,900
June	1,840	0	389	23,100
July	2,560	60	753	46,300

NOTE.—See footnote to daily-discharge table.

FRIO LAKE OUTLET NEAR FOWLERTON, TEX.

LOCATION.—At Frio Lake dam, 2 miles northeast of Fowlerton, La Salle County, and 1½ miles northeast of gaging station on Frio River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 1, 1915, to August 30, 1919, when station was discontinued because break in levee above gage permitted water to flow around dam which served as control.

GAGE.—Vertical staff attached to post on right bank about 100 feet above dam; read by J. F. Martin and W. H. Newbury.

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DISCHARGE MEASUREMENTS.—Made by wading below dam or from railroad bridge about a mile above gage.

CHANNEL AND CONTROL.—Channel straight above and below station for some distance. Right bank clean, cultivated, about 8 feet high; left bank is wooded and is from 5 to 8 feet high; neither bank subject to overflow. Concrete dam about 100 feet below gage serves as control at all stages except when levees above dam were broken (see footnote to daily-discharge table). Point of zero flow at zero gage height.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 3.70 feet on August 27, and again in September (discharge, 5,230 second-feet); no flow for extended periods.

1915-1919: Maximum stage recorded in 1919 (see above); no flow for extended periods each year.

ICE.—None reported.

DIVERSIONS.—Lake is used for storage. Capacity not known.

REGULATION.—Flow controlled at intake on Frio River some distance above; flow of Frio River above this diversion probably not regulated.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined below 4,500 second-feet; above this, subject to considerable error. Gage read to hundredths once daily; one daily gage reading may not be true index of the mean daily discharge. Daily discharge ascertained by applying gage height to rating table. Records fair. Floods washed around end of dam which serves as control, causing loss of records as noted in footnote to daily-discharge table.

Frio Lake is a storage reservoir fed by a diversion from Frio River. The diversion is made 1½ miles above the Frio River dam and the gaging station on the river. The water released from the lake is used for irrigation. This station is maintained in conjunction with that on Frio River at Fowlerton to show the total run-off at that point.

Discharge measurements of Frio Lake outlet near Fowlerton, Tex., during the year ending Sept. 30, 1919.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 26	McCashin and Congdon	1.50	1,050	May 11	C. E. Ellsworth	0.15	18.7
27	do	.77	272	Aug. 30	D. A. Dudley	1.02	[a] 635

[a] Levee at end of dam broken and water flowing around dam.

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Daily discharge, in second-feet, of Frio Lake outlet near Fowlerton, Tex., for the year ending Sept. 30, 1919.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	0	.....	0	19	72	0	312	56	22	1,340	56
2	0	.....	0	12	9.2	0	234	43	422	1,400	43
3	0	.....	0	9.0	2.4	0	299	32	714	312	43
4	0	.....	0	6.0	1.2	0	312	19	166	269	32
5	0	.....	0	4.8	97	0	187	27	299	272	27
6	0	.....	0	3.6	12	0	107	27	116	116	22
7	0	.....	0	3.6	1.2	0	64	32	38	80	19
8	0	0	0	2.4	.....	0	38	27	19	64	19
9	0	0	0	1.2	.....	0	22	22	12	211	16
10	0	0	0	1.2	.....	0	16	16	6.0	617	16
11	68	0	0	0	.....	0	9.2	14	4.8	1,020	12
12	112	0	0	0	.....	0	6.0	12	3.0	1,040	12
13	161	0	0	0	.....	0	6.0	9.2	1.2	246	9.2
14	151	0	0	0	.....	0	4.8	9.2	0	135	6.0
15	140	0	0	0	.....	0	2.4	4.8	0	116	6.0
16	60	0	0	0	.....	0	1.2	88	0	88	4.8
17	60	0	0	0	.....	0	1.2	80	0	72	4.8
18	0	0	0	0	.....	0	0	72	0	48	3.6
19	0	0	166	0	.....	0	0	299	0	43	3.6
20	0	0	575	0	.....	0	0	107	32	38	2.4
21	0	0	819	0	.....	0	0	56	32	48	1.2
22	903	0	1,400	0	.....	0	0	22	97	107	1.2
23	699	0	795	1,240	0	0	0	6.0	234	187	43
24	495	0	312	1,010	0	0	0	43	357	286	135
25	855	0	387	1,810	0	1,040	0	48	457	357	2,130
26	980	0	680	967	0	1,500	0	80	535	915	3,040
27	292	0	312	211	0	617	0	457	617	1,640	.....
28	.....	0	107	107	0	387	0	638	855	1,500	.....
29	.....	0	48	56	.....	286	0	555	967	749	.....
30	.....	0	38	405	.....	135	27	222	1,040	299	495
31	.....	.....	27	166	.....	48	.....	27	.....	116	.....

NOTE.—No record Oct. 28-31, Nov. 1-7, Feb. 8-22, Aug. 27-29, 31, and Sept. 1-30. Floods washed around end of dam in February and again in August. Gage not read Oct. 23; discharge interpolated.

Monthly discharge of Frio Lake outlet near Fowlerton, Tex., for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 1-27	903	0	184	9,850
November 8-30	0	0	0	0
December	1,400	0	183	11,300
January	1,810	0	195	12,000
March	1,500	0	129	7,930
April	312	0	55.0	3,270
May	638	4.8	102	6,270
June	1,040	0	235	14,000
July	1,640	38	443	27,200
August 1-26	3,040	1.2	220	11,300

RIO GRANDE BASIN.

RIO GRANDE NEAR SAN MARCIAL, N. MEX.

LOCATION.—In sec. 19, T. 7 S., R. 1 W., at Atchison, Topeka & Santa Fe Railway bridge 1 mile south of San Marcial. No important tributaries in immediate vicinity of station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 29, 1895, to September 30, 1920.

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GAGE.—Inclined staff established January 29, 1895, and destroyed by flood in 1896. Wire gage established in its place at same datum. This was soon abandoned and gage heights have since been obtained by measuring with graduated rod from bridge deck to water surface. Gage datum unchanged.

DISCHARGE MEASUREMENTS.—Made from the bridge.

CHANNEL AND CONTROL.—Bed sandy and very shifting; broken by several bridge piers. No information on control section.

EXTREMES OF DISCHARGE.—Maximum mean daily stage during year ending September 30, 1919, 15.3 feet on May 12 (discharge, 12,700 second-feet); no flow October 1–19, August 31 to September 20.

Maximum mean daily stage during year ending September 30, 1920, 16.1 feet from May 27 to June 4 (discharge, 22,500 second-feet); no flow September 14 to 18.

1895–1920: Maximum mean daily discharge, 33,000 second-feet on October 11, 1904 (gage-height, 13.75 feet); no flow for periods of varying length each year.

DIVERSIONS.—Considerable water diverted for irrigation above station.

ACCURACY.—Stage-discharge relation not permanent; affected by ice during winter 1918–19. Owing to the shifting control, determinations of daily discharge are based almost entirely on frequent current-meter measurements.

COOPERATION.—Records furnished by United States Reclamation Service, and reduced to three significant figures by United States Geological Survey.

Daily discharge, in second-feet, of Rio Grande near San Marcial, N. Mex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	0	450	550	608	667	549	2,180	11,100	7,580	1,440	2,180	0
2	0	420	670	551	686	475	3,230	9,120	7,580	2,100	7,600	0
3	0	322	1,140	494	704	475	3,050	7,100	8,050	3,100	4,260	0
4	0	340	650	437	695	475	2,880	7,250	6,530	2,820	4,260	0
5	0	350	480	380	685	475	2,880	7,520	5,020	7,840	3,980	0
6	0	317	478	323	675	475	2,880	7,700	4,350	3,600	2,300	0
7	0	318	460	266	675	810	3,140	7,700	3,180	2,360	1,430	0
8	0	295	520	209	534	810	4,240	8,630	2,420	2,610	1,720	0
9	0	292	497	268	462	664	4,030	9,580	2,420	2,610	1,420	0
10	0	285	440	327	520	579	3,680	8,520	2,050	2,840	1,420	0
11	0	350	475	385	638	570	3,050	8,100	1,810	5,440	1,010	0
12	0	342	520	477	696	560	3,340	7,590	1,320	2,960	1,010	0
13	0	380	670	569	638	551	3,340	7,200	1,320	2,500	1,010	0
14	0	430	690	681	638	551	3,380	6,280	1,440	2,280	585	0
15	0	481	680	681	638	642	3,920	5,730	1,410	6,350	585	0
16	0	520	737	681	534	642	3,830	5,730	1,430	8,450	585	0
17	0	442	730	682	534	1,340	3,740	5,730	1,460	6,200	585	0
18	0	496	620	682	534	1,150	3,570	5,960	1,480	7,180	585	0
19	0	445	505	683	534	1,110	3,870	6,300	1,770	8,020	730	0
20	20	520	690	684	610	1,060	4,720	6,300	1,600	8,250	1,040	0
21	401	515	670	685	610	940	4,870	6,550	1,770	6,280	1,150	526
22	580	600	670	686	685	2,400	6,830	6,400	1,770	5,680	830	480
23	500	445	695	670	685	3,860	6,830	7,630	1,790	6,280	385	434
24	540	520	1,290	662	685	3,720	7,100	8,120	1,820	5,500	250	388
25	540	320	1,020	660	732	2,750	8,790	9,300	1,620	2,700	155	342
26	497	320	670	658	960	2,180	10,200	10,400	1,420	1,910	90	295
27	540	446	670	656	673	1,960	8,790	10,800	1,320	1,530	70	295
28	500	405	670	654	549	1,450	12,700	10,700	2,540	1,100	30	295
29	460	421	670	652	.....	1,450	11,600	9,780	4,890	1,200	10	196
30	500	443	670	650	.....	1,520	12,100	8,720	1,230	1,440	2	196
31	478	.....	635	648	.....	1,930	.....	7,950	.....	2,340	0	.....

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Daily discharge, in second-feet, of Rio Grande near San Marcial, N. Mex., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	165	523	898	794	851	1,710	1,300	1,760	22,500	7,750	391	185
2	165	497	794	794	872	1,710	1,360	1,760	22,500	8,400	391	185
3	137	470	794	794	872	1,110	2,110	4,600	22,500	8,100	335	185
4	137	461	794	771	906	1,110	1,650	5,280	22,500	7,120	950	185
5	111	453	794	749	941	1,110	1,380	5,160	21,500	6,900	940	153
6	106	444	980	726	975	1,130	1,280	5,280	21,500	6,150	1,120	121
7	101	444	980	647	975	1,130	1,190	6,400	21,500	5,680	740	112
8	96	550	980	647	1,300	1,130	960	6,200	21,500	5,400	615	88
9	91	550	1,160	647	1,300	1,130	1,000	8,020	21,000	4,650	575	50
10	1,460	795	1,160	595	1,300	1,110	1,440	7,800	19,400	3,620	575	30
11	1,250	795	958	595	1,680	1,110	2,900	8,950	18,700	3,280	615	24
12	1,250	749	958	682	1,680	1,080	3,480	11,000	18,100	2,880	625	16
13	1,040	749	858	682	2,230	1,080	3,270	13,200	16,800	2,360	760	8
14	790	749	858	770	1,600	1,080	3,110	11,300	15,800	2,080	665	0
15	739	749	858	950	1,430	1,080	3,710	11,800	14,900	1,830	690	0
16	739	708	858	1,480	1,090	1,080	3,620	12,600	13,900	1,500	723	0
17	680	695	858	1,400	1,090	1,080	4,320	11,100	13,000	1,380	723	0
18	615	682	858	1,140	879	1,080	3,740	10,200	12,000	1,380	665	0
19	615	670	1,040	907	879	1,090	3,740	8,620	11,200	1,130	625	22
20	602	670	980	838	879	1,090	3,620	7,500	10,500	880	640	50
21	589	670	910	838	997	1,090	2,740	7,500	9,990	880	750	70
22	576	740	849	838	997	1,370	2,080	9,250	9,100	780	740	148
23	577	740	847	838	997	1,460	1,890	12,200	8,160	600	725	200
24	578	740	846	842	1,960	2,370	1,800	13,100	7,250	587	900	200
25	579	845	845	842	4,840	2,610	1,800	13,400	6,820	567	750	205
26	579	860	831	842	4,110	2,430	1,840	14,900	6,370	547	580	210
27	472	750	816	835	2,700	1,930	2,090	22,500	6,700	527	475	170
28	472	680	802	835	2,160	1,640	2,370	22,500	6,070	507	410	130
29	472	820	868	840	1,710	1,580	2,090	22,500	5,650	460	370	120
30	472	898	868	846	.....	1,520	1,920	22,500	7,430	450	320	111
31	550	.....	868	851	.....	1,300	.....	22,500	.....	391	245	.....

NOTE.—River frozen over Dec. 26, 1918, to Jan. 7, 1919; discharge estimated.

Monthly discharge of Rio Grande near San Marcial, N. Mex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	580	0	179	11,000
November	600	285	408	24,300
December	1,290	440	662	40,700
January	686	209	560	34,400
February	960	462	638	35,400
March	3,860	475	1,230	75,600
April	12,700	2,180	5,290	315,000
May	11,100	5,780	7,920	487,000
June	8,050	1,230	2,810	167,000
July	8,450	1,100	4,030	248,000
August	7,600	0	1,330	81,800
September	526	0	115	6,840
The year	12,700	0	2,110	1,530,000
1919-20.				
October	1,460	91	542	33,300
November	898	444	672	40,000
December	1,160	794	896	55,100
January	1,480	595	834	51,300
February	4,840	851	1,520	87,400
March	2,610	1,080	1,370	84,200
April	4,320	960	2,330	139,000
May	22,500	1,760	11,000	676,000
June	22,500	5,650	14,500	863,000
July	8,400	391	2,860	176,000
August	1,120	245	633	38,900
September	210	0	99.3	5,910
The year	22,500	0	3,100	2,250,000

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RIO GRANDE BELOW ELEPHANT BUTTE DAM, N. MEX.

LOCATION.—In T. 13 S., R. 4 W., 1 mile below Elephant Butte dam, in Sierra County. Nearest tributary, Mescal Canyon, enters half a mile downstream.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1920.

GAGE.—Stevens water-stage recorder on left bank, 1 mile below dam.

DISCHARGE MEASUREMENTS.—Made from car and cable at gage.

CHANNEL AND CONTROL.—Bed composed of compact gravel; probably permanent. Control at gravel bar at mouth of Mescal Canyon, which shifts.

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—Flow controlled by Elephant Butte dam which forms reservoir having capacity of 2,638,000 acre-feet.

EXTREMES OF DISCHARGE.—No data.

COOPERATION.—Records furnished by United States Reclamation Service, and reduced to three significant figures by United States Geological Survey.

Daily discharge, in second-feet, of Rio Grande below Elephant Butte dam, N. Mex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	1,080	1,020	15	15	15	572	1,040	2,220	1,980	1,900	1,750	1,440
2	1,060	910	15	15	15	568	1,040	2,250	1,980	1,480	1,750	1,440
3	1,050	785	15	15	15	695	1,060	2,270	2,000	1,900	1,770	1,440
4	1,050	750	15	15	15	785	1,060	2,270	1,910	1,900	1,780	1,450
5	1,050	680	15	15	15	777	1,090	2,300	1,860	1,900	1,780	1,450
6	1,040	575	15	15	15	800	1,150	2,300	1,860	1,900	1,780	1,440
7	1,030	540	15	15	15	806	1,040	2,320	1,860	1,880	1,670	1,440
8	1,020	540	15	15	15	800	1,080	2,320	1,870	1,860	1,750	1,420
9	1,020	570	15	15	15	814	1,080	2,150	1,870	1,900	1,730	1,420
10	1,020	700	15	15	300	806	1,090	2,050	1,870	1,900	1,720	1,410
11	1,020	700	15	15	450	800	1,090	2,120	1,880	1,900	1,540	1,400
12	1,020	685	15	15	450	800	1,110	2,010	1,880	1,900	1,200	1,400
13	1,020	685	15	15	450	806	1,110	1,820	1,880	1,900	1,210	1,400
14	1,020	670	15	15	450	792	1,090	1,860	1,890	1,800	1,210	1,400
15	1,020	248	15	15	540	770	1,110	1,860	1,880	1,630	1,220	1,400
16	1,020	0	15	15	628	765	507	1,880	1,880	1,460	1,220	1,200
17	425	0	15	15	700	990	15	1,880	1,880	1,270	1,240	1,120
18	0	0	15	15	753	982	531	1,880	1,880	1,200	1,250	1,080
19	0	0	15	15	753	998	1,110	1,880	1,880	1,210	1,370	1,060
20	0	0	15	15	753	998	1,150	1,900	1,880	1,220	1,320	1,060
21	0	0	15	15	726	998	1,140	1,900	1,880	1,220	1,440	1,060
22	0	0	15	15	593	998	1,180	1,900	1,880	1,230	1,420	1,060
23	0	0	15	15	593	998	1,340	1,900	1,880	1,300	1,420	850
24	0	0	15	15	593	998	1,600	1,900	1,880	1,300	1,420	610
25	0	0	15	15	593	998	2,080	1,920	1,880	1,280	1,420	605
26	0	0	15	15	596	998	2,100	1,930	1,880	1,180	1,420	605
27	0	0	15	15	583	998	2,140	1,940	1,750	1,170	1,420	605
28	0	0	15	15	568	998	2,160	1,950	1,880	1,190	1,420	605
29	0	0	15	15	.....	998	2,180	1,730	1,880	1,200	1,420	605
30	0	0	15	15	.....	990	2,210	1,950	1,880	1,200	1,440	605
31	0	.....	.....	15	.....	998	.....	1,960	.....	1,420	1,440	.....

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Daily discharge, in second-feet, of Rio Grande below Elephant Butte dam, N. Mex., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	605	473	2	500	2	855	965	1,820	1,830	1,880	2,030	1,480
2	605	710	3	500	3	903	950	1,760	1,840	1,880	2,000	1,470
3	605	710	2	500	2	960	950	1,760	1,860	1,880	2,020	1,460
4	605	710	3	500	3	992	950	1,760	1,860	1,880	2,080	1,640
5	605	710	2	500	2	1,020	950	1,760	1,820	1,880	2,120	1,740
6	605	851	3	613	3	1,020	1,050	1,760	1,820	1,880	2,170	679
7	605	910	2	888	2	1,010	1,100	1,760	1,820	1,900	2,080	1,710
8	605	910	3	888	3	1,010	1,230	1,760	1,820	1,900	2,040	1,700
9	605	910	2	888	2	1,010	1,280	1,770	1,820	1,900	2,040	1,700
10	202	910	3	645	3	1,010	1,460	1,780	1,820	1,900	2,000	1,700
11	2	910	2	2	2	1,100	1,700	1,780	1,920	1,900	2,030	1,700
12	3	341	3	3	3	1,080	1,700	1,800	1,960	1,900	2,040	1,740
13	2	2	2	2	117	1,090	1,630	1,800	1,960	1,900	2,040	1,740
14	3	3	3	3	200	1,090	1,500	1,810	1,960	1,900	2,040	1,730
15	2	2	2	2	547	1,090	1,500	1,810	1,960	1,900	2,040	1,720
16	3	3	3	3	720	1,090	1,500	1,810	1,960	1,910	2,040	1,710
17	2	2	2	2	720	1,090	1,510	1,810	1,960	1,920	2,040	1,710
18	3	3	3	3	720	1,090	1,630	1,820	1,960	1,930	2,040	1,700
19	2	2	2	2	720	1,090	1,690	1,820	1,960	1,930	2,040	1,760
20	3	3	3	3	720	1,090	1,690	1,920	1,960	1,980	2,040	1,920
21	2	2	2	2	720	1,090	1,690	2,000	1,960	2,030	1,800	1,920
22	3	3	3	3	720	1,090	1,690	2,000	1,980	2,030	1,560	1,940
23	2	2	2	2	720	1,090	1,690	2,000	2,000	2,030	1,560	1,940
24	3	3	3	3	720	1,090	1,780	2,000	2,000	2,030	1,560	1,920
25	2	2	2	2	720	1,090	1,840	2,000	2,000	2,030	1,560	1,920
26	3	3	3	3	810	1,090	1,840	2,000	2,000	2,030	1,210	1,940
27	2	2	2	2	855	1,090	1,840	2,000	2,000	2,030	1,090	1,940
28	3	3	333	3	855	1,090	1,840	1,900	1,900	2,030	1,210	1,940
29	2	2	500	2	855	1,060	1,880	1,820	1,900	2,030	1,210	1,940
30	3	3	500	3	.....	894	1,880	1,820	1,900	2,030	1,320	1,940
31	2	.....	500	2	.....	965	.....	1,820	.....	2,030	1,480	.....

Monthly discharge of Rio Grande below Elephant Butte dam, N. Mex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	1,080	0	547	33,600
November	1,020	0	335	19,900
December	15	15	15	922
January	15	15	15	922
February	753	15	400	22,200
March	998	568	874	53,700
April	2,210	15	1,260	75,000
May	2,320	1,730	2,020	124,000
June	2,000	1,750	1,880	112,000
July	1,900	1,170	1,540	94,700
August	1,780	1,200	1,480	91,000
September	1,450	605	1,140	67,800
The year	2,320	0	961	696,000
1919–20.				
October	605	2	184	11,300
November	910	2	303	18,000
December	500	2	61.3	3,770
January	888	2	209	12,900
February	855	2	395	22,700
March	1,090	855	1,040	64,000
April	1,880	950	1,500	89,200
May	2,000	1,760	2,170	133,000
June	2,000	1,820	1,920	114,000
July	2,030	1,880	1,950	120,000
August	2,170	1,090	1,820	112,000
September	1,940	679	1,730	103,000
The year	2,170	2	1,110	804,000

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RIO GRANDE ABOVE PRESIDIO, TEX.

LOCATION.—About 2 miles above the Haciendita, 7 miles above Rio Conchos, and 10 miles west of Presidio post office. From May 22, 1900, to September 25, 1905, and from July 7, 1909, to September 30, 1913, station was maintained at the Haciendita, 9 miles above Presidio and 8 miles above mouth of Rio Conchos. From September 26, 1905, to July 6, 1909, station was 8 miles farther upstream. As no tributaries of consequence enter between the three sites, the flow is practically the same at all of them.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 22, 1900, to March 31, 1914, and September 1, 1919, to March 31, 1920.

GAGE.—Inclined staff. Relation between the gage readings at the different sites not known. W. P. Millington, observer.

DISCHARGE MEASUREMENTS.—Made from cable and car about 600 feet above gage.

CHANNEL AND CONTROL.—Channel straight for 1,000 feet above the gage. Right and left banks of medium height and steep. Bed composed of mud and sand and shifts greatly.

EXTREMES OF DISCHARGE.—September 1, 1919, to March 31, 1920; maximum discharge 18,100 second-feet, September 15 and 16; minimum discharge, 13 second-feet, January 9, 1920.

DIVERSIONS.—Considerable water diverted at Elephant Butte dam, and other points above the station, for irrigation; total amount not known. Records of the Board of Water Engineers for the State of Texas shows that about 180,000 acres were irrigated in 1920 in Texas by diversions below the station, practically all of which are in Hidalgo and Cameron counties.

REGULATION.—Flow largely regulated by storage at Elephant Butte dam, 120 miles above El Paso.

ACCURACY.—Stage-discharge relation not permanent. Daily discharge based almost entirely on frequent measurements.

COOPERATION.—Station maintained and records furnished by the United States section of the International Boundary Commission.

Discharge measurements of Rio Grande above Presidio, Tex., for the period Sept. 2, 1919, to Mar. 30, 1920.

[Made by engineers of the United States section of the International Boundary Commission.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1919.	*Feet.*	*Sec.-ft.*	1919.	*Feet.*	*Sec.-ft.*	1920.	*Feet.*	*Sec.-ft.*
Sept. 2	4.3	89	Nov. 11	4.6	119	Feb. 3	4.6	43
5	4.1	43	14	4.4	67	6	4.6	39
8	3.9	33	17	4.8	122	9	4.6	30
11	5.6	613	20	5.2	223	12	4.5	26
14	7.7	1,955	23	5.2	204	15	4.5	28
15	16.0	18,080	26	4.8	122	18	4.4	24
Oct. 3	5.7	520	29	4.7	93	22	4.3	22
6	5.8	568	Dec. 18	4.3	29	24	4.3	19
9	5.7	484	21	4.3	33	28	4.6	49
12	6.0	762	24	4.3	29	Mar. 3	4.9	86
15	5.8	544	27	4.2	20	6	4.4	46
18	5.9	696	30	4.2	18	9	4.2	28
21	5.8	552				12	4.1	23
24	5.3	374	1920.			18	4.9	92
27	5.0	252	Jan. 1	4.1	17	21	5.2	153
30	4.8	201	6	4.1	15	24	5.2	158
Nov. 2	5.2	418	9	4.1	13	27	5.1	130
5	4.9	219	12	4.2	15	30	5.0	121
8	4.7	151	15	5.6	257			

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Daily discharge, in second-feet, of Rio Grande above Presidio, Tex., for the period Sept. 1, 1919, to Mar. 31, 1920.

Day.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Day.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1	89	520	378	93	17	43	86	16	18,080	544	122	29	378	24	67
2	89	520	418	93	17	43	86	17	934	596	122	29	378	24	92
3	89	520	418	87	17	43	86	18	934	596	174	29	401	24	92
4	56	520	380	87	17	43	46	19	628	596	174	33	401	24	92
5	43	568	219	58	15	39	46	20	628	552	223	33	401	22	153
6	43	568	219	58	15	39	46	21	613	552	223	33	122	22	153
7	40	568	200	58	15	38	28	22	613	552	204	29	122	22	153
8	33	484	151	37	14	34	28	23	759	374	204	29	94	20	153
9	550	484	151	37	13	30	28	24	759	374	162	29	94	19	153
10	578	636	119	37	14	30	28	25	759	300	122	28	94	19	153
11	613	682	119	37	15	30	23	26	837	250	122	24	56	28	130
12	784	762	119	29	15	26	23	27	837	252	122	20	56	36	130
13	1,528	762	85	29	257	26	23	28	624	252	104	19	56	49	130
14	1,955	544	67	29	257	28	23	29	624	201	93	18	43	49	121
15	18,080	544	67	29	257	28	67	30	520	201	93	18	43	.....	121
								31	.....	378	.....	18	43	.....	121

Monthly discharge of Rio Grande above Presidio, Tex., for the period Sept. 1, 1919, to Mar. 31, 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
September	18,100	33	1,760	105,000
October	762	201	492	30,300
November	418	67	179	10,700
December	93	18	39	2,400
January	401	13	121	7,440
February	49	19	31	1,780
March	153	23	86	5,290
The period	.....	.....	.....	163,000

NOTE.—Monthly discharge computed by engineers of U. S. Geol. Survey.

RIO GRANDE BELOW PRESIDIO, TEX.

LOCATION.—At west end of canyon section of Rio Grande, 7 miles below Presidio at Loma Paloma, 8 miles below mouth of Rio Conchos, and 1 mile above mouth of Alamito Creek. Discharge at this station, minus discharge at station above Presidio, is discharge of Rio Conchos, except occasionally, when some run-off enters Rio Grande from north.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 1, 1900, to July 31, 1915; September 1, 1919, to March 31, 1920.

GAGE.—Vertical staff in main channel; read by W. T. Millington. At low stages river shifts back and forth in its bed, necessitating establishment of temporary gages. Relation between this gage and previous gages not known.

DISCHARGE MEASUREMENTS.—Made in main channel from car and cable and in overflow section from boat.

CHANNEL AND CONTROL.—Shifting sand; affected by an intermittent stream, Alamito Creek, which reaches the river 1 mile below the station. This creek is subject to torrential floods which bring large quantities of boulders and gravel into the Rio Grande, forming a temporary dam which causes changes in the stage-discharge relation. The channel overflows at gage height 7 feet to an extreme width of 1,000 feet, where gravel hills are found.

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EXTREMES OF DISCHARGE.—September 1, 1919, to March 31, 1920: Maximum discharge, 53,638 second-feet, September 1–3; minimum discharge 1,019 second-feet, March 30 and 31.

Below the mouth of the Rio Conchos the Rio Grande is subject to severe floods from this tributary. Since the records have been maintained, the highest flood occurred September 11, 1904, reaching a stage of 26.35 feet and a discharge of 149,200 second-feet. On the same day the discharge above Rio Conchos was only 2,600 second-feet.

ICE.—None.

DIVERSIONS.—Considerable water diverted at Elephant Butte dam and other points above the station for irrigation. Total amount not known. Records of the Board of Water Engineers for the State of Texas show that about 180,000 acres were irrigated in Texas in 1920 by diversions below the station, practically all of which are in Hidalgo and Cameron counties.

REGULATION.—Flow partly regulated by storage at Elephant Butte dam, 120 miles above El Paso.

ACCURACY.—Owing to shifting channel the determinations of daily discharge is based almost directly on frequent current-meter measurements.

COOPERATION.—Station maintained by the United States section of the International Boundary Commission, by whom the records were furnished.

Discharge measurements of Rio Grande below Presidio, Tex., for the period Sept. 3, 1919, to Mar. 31, 1920.

(Made by engineers of the United States section of the International Boundary Commission.)

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1919.	*Feet.*	*Sec.-ft.*	1919.	*Feet.*	*Sec.-ft.*	1920.	*Feet.*	*Sec.-ft.*
Sept. 3	23.0	53,638	Nov. 15	12.6	4,699	Feb. 7	12.7	2,769
6	15.0	15,566	18	12.6	5,124	10	12.6	2,514
9	14.5	10,592	21	12.5	4,795	13	12.4	2,427
12	14.4	9,877	24	12.6	4,487	16	12.4	1,949
15	16.1	18,182	27	12.4	3,979	19	12.3	1,880
Oct. 4	17.8	21,943	30	12.4	3,860	22	12.3	1,713
7	17.5	21,837	Dec. 19	12.1	2,157	25	12.3	1,504
10	17.7	21,429	22	12.1	1,952	29	12.2	1,335
13	16.3	17,568	26	12.1	1,782	Mar. 4	12.1	1,404
16	14.5	15,025	28	12.0	1,551	7	12.1	1,053
19	14.7	14,063	31	12.0	1,582	10	12.0	1,154
22	14.1	12,916				16	11.9	1,142
25	14.0	11,881	1920.			19	11.95	1,164
28	13.4	9,734	Jan. 4	12.0	1,530	22	12.0	1,188
31	15.1	15,575	7	11.9	1,451	25	12.1	1,326
Nov. 3	13.4	10,045	10	12.0	1,615	28	12.0	1,219
6	13.2	8,725	13	12.0	1,584	31	11.7	1,019
9	12.9	6,480	16	12.6	3,242			
12	12.7	5,103	Feb. 4	12.8	3,274			

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Daily discharge, in second-feet, of Rio Grande below Presidio, Tex., for the period Sept. 1, 1919, to Mar. 31, 1920.

Day.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1	53,638	37,594	12,782	3,072	1,582	3,274	1,335
2	53,638	37,594	10,045	3,072	1,582	3,274	1,402
3	53,638	21,943	10,045	3,072	1,532	3,274	1,402
4	41,270	21,943	10,045	2,554	1,532	3,274	1,404
5	18,529	21,943	8,725	2,554	1,530	2,709	1,053
6	15,556	21,837	8,725	2,554	1,451	2,769	1,053
7	14,225	21,837	8,725	2,554	1,451	2,769	1,053
8	10,592	21,837	6,480	2,234	1,451	2,769	1,154
9	10,592	21,429	6,480	2,234	1,575	2,514	1,154
10	10,592	21,429	6,480	2,234	1,615	2,514	1,154
11	9,877	21,429	5,103	2,234	1,615	2,427	1,142
12	9,877	18,234	5,103	2,234	1,584	2,427	1,142
13	9,827	17,568	5,103	2,234	1,584	2,427	1,142
14	16,701	17,568	4,699	2,157	3,246	1,949	1,142
15	18,182	17,568	4,699	2,157	3,246	1,949	1,142
16	14,063	15,025	4,699	2,157	3,242	1,949	1,164
17	14,063	15,025	5,124	2,157	3,242	1,880	1,164
18	14,063	15,025	5,124	2,157	3,242	1,880	1,164
19	15,294	14,063	5,124	2,157	3,242	1,880	1,164
20	15,294	14,063	4,795	2,010	3,242	1,713	1,188
21	19,782	14,063	4,795	1,952	3,242	1,713	1,188
22	19,782	12,916	4,795	1,952	3,242	1,713	1,188
23	19,782	12,916	4,487	1,952	3,242	1,504	1,279
24	18,568	12,916	4,487	1,782	3,242	1,504	1,326
25	18,182	11,881	4,487	1,782	3,242	1,504	1,326
26	18,182	11,881	3,979	1,782	3,242	1,504	1,326
27	37,594	11,881	3,979	1,551	3,242	1,335	1,219
28	37,594	9,734	3,979	1,551	3,242	1,335	1,219
29	47,891	9,734	3,860	1,551	3,242	1,335	1,125
30	38,627	10,645	3,860	1,582	3,242	.....	1,019
31	.....	15,575	.....	1,582	3,242	.....	1,019

Monthly discharge of Rio Grande below Presidio, Tex., for the period Sept. 1, 1919, to Mar. 31, 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
September	53,600	9,830	23,200	1,380,000
October	37,600	9,730	17,700	1,090,000
November	12,800	3,860	6,030	359,000
December	3,070	1,550	2,160	133,000
January	3,280	1,450	2,530	156,000
February	3,270	1,340	2,180	125,000
March	1,400	1,020	1,190	73,200
The period	.....	.....	.....	3,320,000

NOTE.—Monthly discharge computed by engineers of U. S. Geol. Survey.

RIO GRANDE AT LANGTRY, TEX.

LOCATION.—At east end of canyon section, 1,800 feet east of Langtry and a few miles above the mouth of Pecos River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 1, 1900, to October 15, 1914; and December 1, 1919, to March 31, 1920.

GAGE.—Vertical staff. Relation between datum of this gage and previous gages not known. Read by W. H. Dodd.

DISCHARGE MEASUREMENTS.—Made from car and cable.

CHANNEL AND CONTROL.—Bed composed of mud, sand, gravel, and boulders; very shifting and subject to overflow at high stages. The overflow extends 110 feet back of the main bank.

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EXTREMES OF DISCHARGE.—December 1, 1919, to March 31, 1920; Maximum discharge, 2,565 second-feet, January 21, 1920; minimum discharge, 855 second-feet March 16, 1920.

The highest stage on record occurred on September 14, 1919, when the stage was 50.5 feet (discharge not determined).

ICE.—None.

DIVERSIONS.—Considerable water is diverted at Elephant Butte dam and other points above the station for irrigation. Total amount not known. Records of the Board of Water Engineers for the State of Texas show that about 180,000 acres were irrigated in Texas, in 1920 by diversions below the station, practically all of which are in Hidalgo and Cameron counties.

REGULATION.—Flow partly regulated by storage at Elephant Butte dam, 120 miles above El Paso.

ACCURACY.—Owing to the shifting of the channel determinations of daily discharge are based almost directly on frequent current-meter measurements.

COOPERATION.—Station maintained by the United States section of the International Boundary Commission, by whom the records were furnished.

Discharge measurements of Rio Grande at Langtry, Tex., for the period Sept. 9, 1919, to Mar. 29, 1920.

[Made by engineers of the United States section of the International Boundary Commission.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge
1919.	*Feet*	*Sec.-ft.*	1920.	*Feet.*	*Sec.-ft.*	1920.	*Feet.*	*Sec.-ft.*
Sept. 9	4.5	9,370	Jan. 1	.8	1,176	Feb. 20	.8	1,286
12	4.4	8,443	7	.8	1,150	24	.9	1,349
Oct. 7	2.0	2,568	13	.8	1,196	Mar. 2	.8	1,266
26	1.4	1,725	17	.9	1,222	6	.8	1,325
Dec. 1	1.2	1,443	20	.9	1,293	13	.6	1,050
5	1.00	1,387	27	1.7	2,003	16	.5	855
11	1.0	1,396	Feb. 2	1.7	1,969	19	.4	887
17	1.0	1,280	6	1.6	1,850	23	.4	1,007
22	.9	1,271	10	1.4	1,638	29	.4	960
29	.8	1,234	16	.9	1,357			

Daily discharge, in second-feet, of Rio Grande at Langtry, Tex., for the period Dec. 1, 1919, to Mar. 31, 1920.

Day.	Dec.	Jan.	Feb.	Mar.	Day.	Dec.	Jan.	Feb.	Mar.
1	1,443	1,176	2,003	1,266	16	1,280	1,222	1,357	855
2	1,443	1,176	1,969	1,266	17	1,280	1,222	1,357	855
3	1,443	1,176	1,969	1,300	18	1,271	1,256	1,357	887
4	1,443	1,176	1,850	1,325	19	1,271	1,292	1,280	887
5	1,387	1,150	1,850	1,300	20	1,271	1,297	1,286	887
6	1,387	1,150	1,850	1,325	21	1,271	2,565	1,280	887
7	1,387	1,150	1,850	1,325	22	1,271	2,003	1,286	965
8	1,396	1,150	1,850	1,325	23	1,250	1,969	1,349	1,007
9	1,396	1,165	1,638	1,260	24	1,250	1,850	1,349	1,007
10	1,396	1,196	1,638	1,260	25	1,250	2,565	1,349	960
11	1,396	1,196	1,638	1,150	26	1,250	2,565	1,349	960
12	1,387	1,196	1,600	1,055	27	1,234	2,003	1,349	960
13	1,387	1,196	1,600	1,055	28	1,176	2,003	1,349	960
14	1,380	1,196	1,458	1,055	29	1,176	2,003	1,349	960
15	1,300	1,200	1,458	950	30	1,176	2,003	.....	960
					31	1,176	2,003	.....	960

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Monthly discharge of Rio Grande at Langtry, Tex., for the period Dec. 1, 1919, to Mar. 31, 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
December	1,440	1,180	1,320	81,200
January	2,560	1,150	1,530	94,100
February	2,000	1,280	1,550	89,200
March	1,320	855	1,070	65,800
The period				330,000

NOTE.—Monthly discharge computed by engineers of U. S. Geol. Survey.

RIO GRANDE NEAR DEVILS RIVER, TEX.

LOCATION.—Near McKees Switch, 4½ miles below mouth of Devils River and town of Devils River and 3½ miles below site of former station. Several springs but no tributaries of consequence enter between the two sites.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 1, 1900, to April 30, 1915, and December 1, 1919, to March 31, 1920.

GAGE.—Inclined staff. Relation between datum of this gage and previous gages not known.

DISCHARGE MEASUREMENTS.—Made from car and cable.

CHANNEL AND CONTROL.—Shifting greatly and subject to overflow for a distance of 500 feet.

EXTREMES OF DISCHARGE.—December 1, 1919, to March 31, 1920; Maximum discharge, 9,730 second-feet, December 28, 1919; minimum discharge, 2,540 second-feet, March 21, 1920. In September, 1919, the river reached a stage of 41 feet; discharge not determined.

ICE.—None reported.

DIVERSIONS.—Considerable water diverted at Elephant Butte dam and other points above the station for irrigation. Total amount not known. Records of the Board of Water Engineers for the State of Texas show that about 180,000 acres were irrigated in Texas in 1920 by diversions below the station, practically all of which are in Hidalgo and Cameron counties.

REGULATION.—Flow partly regulated by storage at Elephant Butte dam, 120 miles above El Paso.

ACCURACY.—Owing to the shifting channel determinations of daily discharge are based almost directly on frequent current-meter measurements. Several springs discharge above this location that were not measured at the previous location of the station.

COOPERATION.—Station maintained by the United States section of the International Boundary Commission, by whom the records were furnished.

Discharge measurements of Rio Grande near Devils River, Tex., for the period Sept. 10, 1919, to Mar. 26, 1920.

[Made by engineers of the United States section of the International Boundary Commission.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Guage height.	Discharge.
1919.	*Feet.*	*Sec.-ft.*	1920.	*Feet.*	*Sec.-ft.*	1920.	*Feet.*	*Sec.-ft.*
Sept. 10	3.9	10,229	Feb. 4	2.2	3,693	Mar. 9	1.75	3.077
Dec. 9	2.1	3,629	19	2.0	3,501	15	1.60	2.710
15	2.1	3,549	23	1.9	3,588	18	1.6	2.693
19	2.2	3,838	27	1.9	3,450	22	1.5	2.546
24	2.0	3,577	Mar. 4	1.7	3,017	26	1.6	2.686

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Daily discharge, in second-feet, of Rio Grande near Devils River, Tex., for the period Dec. 1, 1919, to Mar. 31, 1920.

Day.	Dec.	Jan.	Feb.	Mar.	Day.	Dec.	Jan.	Feb.	Mar.
1	3,628	3,588	7,429	3,165	16	3,549	3,450	3,693	2,710
2	3,628	3,588	6,280	3,165	17	3,549	3,450	3,693	2,710
3	3,628	3,588	6,280	3,165	18	3,838	3,577	3,501	2,693
4	3,628	3,588	5,375	3,017	19	3,838	3,577	3,501	2,693
5	3,628	3,588	5,375	3,017	20	3,838	3,577	3,501	2,693
6	3,628	3,588	5,375	3,017	21	3,750	3,577	3,588	2,540
7	3,628	3,450	5,375	3,017	22	3,650	3,577	3,588	2,546
8	3,628	3,450	5,375	3,077	23	3,600	3,577	3,588	2,546
9	3,628	3,588	4,219	3,077	24	3,577	3,450	3,450	2,546
10	3,600	3,588	4,216	3,077	25	3,577	3,450	3,450	2,546
11	3,600	3,450	3,690	3,077	26	3,501	3,840	3,450	2,686
12	3,600	3,450	3,693	3,077	27	3,501	4,578	3,450	2,686
13	3,549	3,450	3,693	2,710	28	3,501	9,726	3,450	2,686
14	3,549	3,450	3,693	2,710	29	3,558	8,536	3,436	2,686
15	3,549	3,450	3,693	2,710	30	3,558	7,429	.....	2,686
					31	3,558	7,429	.....	2,686

Monthly discharge of Rio Grande near Devils River, Tex., for the period Dec. 1, 1919, to Mar. 31, 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
December	3,840	3,500	3,610	222,000
January	9,730	3,450	4,180	257,000
February	7,430	3,440	4,240	244,000
March	3,160	2,540	2,820	173,000
The period	.....	.....	.....	896,000

NOTE.—Monthly discharge computed by engineers of U. S. Geol. Survey.

PECOS RIVER NEAR DAYTON, N. MEX.

LOCATION.—In sec. 13, T. 18 S., R. 26 E., 3 miles east of Dayton, Eddy County, half a mile above mouth of Penasco River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 24, 1905, to September 30, 1920.

GAGE.—Stevens water-stage recorder on right bank; installed August 27, 1914, at same site and datum as staff gage installed September 7, 1905. Original gage which was 100 feet below the mouth of Penasco River, and half a mile below present gage was washed out September 6, 1905.

DISCHARGE MEASUREMENTS.—Made from cable.

CHANNEL AND CONTROL.—Bed composed of sand and gravel. Shifts, especially during high stages. Right bank consists of clay, left bank of sand; both banks are overflowed at stage of about 11.5 feet; no well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 15.9 feet for 5 or 6 hours during morning of September 18 (discharge not determined; probably exceeded previous maximum of 50,300 second-feet on July 25, 1915, which was derived from discharge at Lake McMillan and included flow of Penasco River); minimum mean daily stage, 3.28 feet October 3 (discharge, 65 second-feet).

Maximum mean daily gage height during year ending September 30, 1920, 10.4 feet October 10 (discharge, 3,460 second-feet); minimum mean daily discharge, 60 second-feet, August 10.

1905–1920: Maximum stage recorded in 1919 (see above paragraph); minimum stage, 2.45 feet July 26 and 27, 1916 (discharge, 23 second-feet).

ICE.—None.

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DIVERSIONS.—Considerable water is diverted above station for irrigation; quantity not known, but not in conflict with rights of Carlsbad project of the United States Reclamation Service, which serves about 20,000 acres in the vicinity of Carlsbad and stores part of the water used near Carlsbad in Lake McMillan, 10 miles below gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent, but periods of change are covered by frequent discharge measurements. Standard rating curve fairly well defined for all stages. Mean daily gage height determined from recorder graph or staff gage readings. Daily discharge ascertained by applying mean daily gage height to rating table or by shifting-control method, except March 22–25 and September 16–18, 1919, when it was determined by measurements made at Lake McMillan headgates and spillways. Records good.

COOPERATION.—Daily-discharge record and results of current-meter measurements furnished by the United States Reclamation Service.

Discharge measurements of Pecos River near Dayton, N. Mex., during the years ending Sept. 30, 1919 and 1920.

[Made by engineers of United States Reclamation Service.]

Date	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1918.	*Feet.*	*Sec.-ft.*	1919.	*Feet.*	*Sec.-ft.*	1920.	*Feet.*	*Sec.-ft.*
Nov. 4	4.42	297	Aug. 11	8.35	1,554	Mar. 11	4.74	270
20	4.00	202	17 [a]	5.79	233	24	4.27	181
Dec. 8	4.48	330	27	5.30	154	Apr. 7	4.10	157
1919.			Sept. 5	5.11	128	29	4.26	179
Jan. 1	4.30	268	12	5.16	151	May 11	7.30	1,507
25	4.50	346	29	6.50	932	31	7.36	1,113
Feb. 10	4.12	225	Oct. 10	10.65	3,743	June 7	9.70	2,707
Mar. 1	3.95	209	16	7.38	1,205	17	6.40	598
11	3.55	143	25	5.72	457	30	7.05	1,331
June 23	7.35	1,069	Nov. 6	5.42	390	July 12	7.52	1,140
26	6.72	933	14	5.20	351	30	4.30	77
30	8.15	1,632	Dec. 8	5.35	389	Aug. 8 [b]	4.15	61
July 13	7.50	1,008	1920.			23	5.70	339
24	8.40	1,506	Jan. 4	5.20	359	Sept. 7	5.00	187
29	7.10	685	19	5.90	617	15	4.54	110
Aug. 6	7.80	1,004	Feb. 18	5.10	352	23	4.38	80

[a] Made by engineers of U. S. Geol. Survey. [b] Made by R. W. Atha.

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Daily discharge, in second-feet, of Pecos River near Dayton, N. Mex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	74	311	372	263	269	209	410	1,290	1,142	1,186	790	283
2	67	310	347	287	265	203	675	1,136	1,032	1,410	1,000	212
3	65	308	325	336	276	198	850	800	1,010	1,543	900	152
4	67	302	324	402	276	198	1,120	600	911	1,623	1,186	103
5	67	284	350	450	269	189	700	464	825	1,440	1,242	116
6	67	272	350	446	263	192	550	437	700	1,458	1,092	116
7	67	260	338	407	253	176	333	570	560	1,488	785	99
8	67	240	330	373	245	157	248	760	432	1,500	625	93
9	84	236	318	344	245	153	239	900	340	1,410	750	102
10	124	224	312	317	241	150	333	1,175	306	1,302	1,175	102
11	100	224	312	287	245	147	333	1,664	370	1,290	1,230	117
12	83	216	302	267	234	143	239	1,290	464	1,320	1,092	152
13	75	212	298	276	228	147	175	875	900	1,087	850	116
14	71	212	298	298	228	143	137	725	1,902	955	700	86
15	69	214	290	385	217	135	198	600	3,780	890	402	77
16	69	252	290	432	217	136	248	525	2,412	962	299	10,000
17	69	288	280	459	223	136	230	491	1,320	1,208	263	24,200
18	73	264	272	473	219	133	222	525	1,081	2,004	316	40,000
19	88	230	278	501	219	129	214	433	1,302	2,548	500	3,620
20	90	202	290	544	219	123	198	355	1,868	2,208	625	2,616
21	665	205	327	597	219	144	160	423	1,732	1,868	525	2,106
22	4,420	207	358	520	219	4,100	137	565	1,440	1,766	299	1,630
23	4,420	194	358	455	219	21,600	160	625	1,148	1,698	351	1,299
24	1,530	188	348	415	219	26,000	267	725	860	1,583	248	1,203
25	955	190	330	377	223	10,000	675	1,272	700	1,410	198	1,218
26	650	200	316	344	226	2,242	1,410	2,446	700	1,290	175	1,260
27	600	240	300	317	221	1,470	2,106	1,772	1,065	1,092	167	983
28	750	242	272	294	209	650	3,940	1,506	1,950	928	152	775
29	182	244	252	291	.....	333	2,548	1,374	1,922	800	130	660
30	570	303	252	276	.....	239	1,576	1,290	1,500	750	116	635
31	455	.....	252	276	.....	227	.....	1,230	.....	640	109	.....
1919-20.												
1	775	491	370	381	390	263	166	200	945	710	76	222
2	900	477	340	328	395	263	167	195	885	583	76	191
3	650	455	370	328	401	253	160	195	850	579	74	176
4	640	432	459	343	401	248	159	184	896	560	73	169
5	575	446	455	353	390	265	159	165	677	395	72	194
6	491	419	410	404	419	289	158	159	867	312	72	198
7	491	432	390	468	410	293	157	162	2,115	257	70	187
8	500	432	390	560	435	289	153	165	1,975	238	66	150
9	1,470	378	370	563	419	293	153	311	1,485	220	66	136
10	3,460	390	333	451	419	285	145	316	1,208	229	66	141
11	2,106	333	340	375	401	270	139	710	968	600	60	133
12	1,773	333	333	384	413	249	142	840	796	926	70	114
13	1,350	333	326	404	404	234	142	710	591	559	83	106
14	1,093	333	306	413	375	224	142	760	533	392	230	106
15	1,087	340	293	461	359	217	142	812	812	331	324	110
16	1,314	340	378	496	359	208	142	879	812	276	392	112
17	1,059	363	370	560	348	201	142	735	663	228	438	98
18	890	370	333	587	348	201	139	587	620	194	658	85
19	790	370	299	600	335	201	139	521	468	178	644	91
20	725	370	419	489	321	192	139	451	420	160	486	78
21	675	370	500	475	307	193	139	375	426	152	437	70
22	625	390	455	475	316	184	142	375	420	144	363	71
23	600	410	419	435	314	182	164	1,485	375	178	341	83
24	590	402	410	398	309	182	187	1,112	348	187	344	94
25	550	390	432	398	296	177	179	1,050	323	182	314	94
26	510	370	433	398	291	176	203	1,380	312	133	265	74
27	491	432	402	398	285	168	233	1,415	312	112	234	68
28	477	390	378	392	282	169	222	1,310	362	98	242	70
29	464	402	370	390	270	171	203	1,175	367	88	341	85
30	491	410	340	390	.....	169	203	1,050	735	78	283	88
31	491	.....	351	390	.....	171	.....	1,000	.....	76	238	.....

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Monthly discharge of Pecos River near Dayton, N. Mex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	4,420	65	540	33,200
November	311	188	242	14,400
December	372	262	311	19,100
January	597	263	378	23,200
February	276	209	236	13,100
March	26,000	123	2,260	139,000
April	3,940	137	688	40,900
May	2,450	355	930	57,200
June	3,780	306	1,190	70,800
July	2,560	640	1,380	84,800
August	1,240	109	590	36,300
September	40,000	77	3,140	187,000
The year	40,000	65	993	719,000
1919–20.				
October	3,460	464	906	55,700
November	491	333	393	23,400
December	500	293	380	23,400
January	600	328	435	26,700
February	435	270	359	20,600
March	293	168	222	13,600
April	233	139	162	9,640
May	1,480	159	670	41,200
June	2,120	312	753	44,800
July	926	76	301	18,500
August	658	60	242	14,900
September	232	68	120	7,140
The year	3,460	60	413	300,000

NOTE.—Monthly discharge computed by engineers of U. S. Geol. Survey.

Days of deficiency in charge of Pecos River near Dayton, N. Mex., for the years ending Sept. 30, 1906–1920.

Discharge in second-feet.	Days of deficient discharge.														
	1906–6	1906–7	1907–8	a 1908–9	1909–10	1910–11	1911–12	1912–13	1913–14	1914–15	1915–16	1916–17	1917–18	1918–19	1919–20
50	.....	.....	7	80	19	.....	1	3	.....	.....	28	49	9	.....	.....
75	.....	.....	54	119	61	9	18	26	.....	4	34	69	48	13	15
100	13	12	94	154	106	37	34	83	3	22	37	100	124	22	31
125	20	40	136	171	179	91	62	151	37	34	47	129	187	34	37
150	49	75	162	200	216	120	82	184	68	37	76	156	220	47	55
175	64	84	173	225	237	165	109	218	106	42	88	178	251	56	79
200	84	120	180	230	248	193	126	234	118	56	106	186	269	70	100
250	115	148	189	263	272	248	185	262	172	85	155	221	320	120	124
300	158	175	210	285	320	282	241	295	236	116	222	282	331	160	145
350	188	208	244	318	324	303	280	320	258	157	264	317	336	191	183
400	225	243	279	339	331	311	303	333	271	226	284	329	342	202	231
450	242	262	299	342	339	317	309	340	276	263	294	338	343	213	267
500	254	282	306	346	344	325	315	344	278	275	301	345	345	221	290
550	267	307	314	347	347	329	327	346	288	283	310	349	348	228	295
600	287	318	314	347	349	336	332	347	294	292	317	355	350	234	305
650	304	328	314	347	349	337	332	349	297	299	328	356	353	242	315
700	320	339	319	347	353	339	338	349	305	306	331	359	353	249	320
800	337	347	322	350	354	341	342	350	312	317	341	360	355	262	330
900	347	351	326	352	355	347	346	352	317	327	346	362	357	271	340
1,000	351	358	334	352	355	350	357	353	326	333	347	362	360	279	344
1,200	358	359	341	354	356	357	362	356	336	343	356	363	360	296	352
1,400	358	361	343	356	357	359	365	356	344	349	360	393	361	315	357
1,700	361	363	353	356	358	360	365	358	354	354	363	363	363	335	361
2,000	362	364	358	356	358	361	365	358	357	356	363	363	363	343	363
2,500	363	364	361	356	360	362	365	362	359	361	365	364	364	350	365
3,000	364	364	363	356	360	362	365	362	362	361	365	365	364	353	365
4,000	365	365	365	366	361	362	366	362	363	362	365	.....	365	356	366
6,000	.....	.....	365	357	362	362	.....	364	363	362	365	.....	.....	359	.....
8,000	.....	.....	366	.....	363	363	.....	364	364	362	366	.....	.....	359	.....
10,000	.....	.....	.....	.....	365	364	.....	364	364	362	.....	.....	.....	359	.....
15,000	.....	.....	.....	.....	.....	365	.....	365	364	363	.....	.....	.....	361	.....
50,000	.....	.....	.....	.....	.....	.....	.....	.....	365	365	.....	.....	.....	365	.....

a Daily discharge for July 26 to Aug. 2, 1908, not included. Figures given for discharge above 90 second-feet are therefore subject to error.

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PECOS RIVER AT CARLSBAD, N. MEX.

LOCATION.—In SE. ¼ sec. 6, T. 22 S., R. 27 E., at Green Street Bridge in Carlsbad, Eddy County, 300 feet downstream from Atchison, Topeka & Santa Fe Railway station, 1,500 feet above mouth of Dark Canyon, and 2,000 feet below Hagerman dam.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 28, 1903, to March 31, 1908; May 13, 1914, to September 30, 1920.

GAGE.—Stevens 8-day water-stage recorder attached to downstream end of middle bridge pier, installed June 1, 1920. Gage used from May 28, 1903, to October, 1904, was inclined staff gage at the present site. From October, 1904, to March 31, 1908, vertical staff gage at the same site used, and from May 18, 1914, to June 1, 1920, gage was vertical staff, attached to upstream side of middle pier of bridge.

DISCHARGE MEASUREMENTS.—Made by wading or from bridge.

CHANNEL AND CONTROL.—Bed composed of gravel and rock; but considerable changes have taken place, owing to sand deposits. Banks of medium height; not subject to overflow. Position of control not known.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 12.5 feet March 25 and September 19 (discharge, 23,600 second-feet, determined from poorly defined rating curve); minimum discharge, 39 second-feet, November 24.

Maximum stage recorded during year ending September 30, 1920, 5.8 feet October 11 and 12 (discharge, 5,910 second-feet); minimum stage from water-stage recorder, 0.61 foot at 9 a. m. June 27 and 10 a. m. September 19 (discharge, 70 second-feet).

1903–1908; 1914–1920: Maximum stage recorded, about 21.0 feet August 7, 1916 (discharge, 85,700 second-feet[1]); minimum discharge, 30 second-feet September 30, 1918.

ICE.—None.

DIVERSIONS.—Large quantities of water are stored a few miles above station at Lakes McMillan and Avalon by the United States Reclamation Service for irrigating lands near Carlsbad. Water is also diverted for irrigation in valleys adjacent to river above Lake McMillan. Capacity of storage reservoirs in connection with the Carlsbad project, 58,500 acre-feet. Considerable water seeps into the river between the storage reservoirs and the gaging station, the quantity depending on the amount being used for irrigation between the two points.

REGULATION.—Flow at this point completely controlled by storage reservoirs of the Carlsbad project, except during extreme floods.

ACCURACY.—Stage-discharge relation not permanent. From October 1, 1918, to September 30, 1919, standard rating curve fairly well defined below 12,000 second-feet, except for extremely low stages. Gage read once daily to half-tenths and is only an approximate indication of the mean daily gage height, because of rapid fluctuation in stage due to operation of storage reservoirs. From October 1, 1919, to September 30, 1920, standard rating curve fairly well defined for low and high stages but poorly defined for intermediate stages. Daily discharge, October 1, 1919, to May 31, 1920, ascertained by applying to rating table daily gage reading; June 1 to September 30, 1920, by indirect method for shifting control, using mean daily gage height determined from recorder graph except on days of considerable range in stage, when it was determined by averaging results obtained by using gage heights for 2-hour periods, and except as noted in footnote to daily-discharge table. Records poor from October, 1919, to March 1920, account of daily gage reading not representing the mean for the day, because of water being released from Lake Avalon during night. Discharge probably too small. Records fair during April and May and good for June to September. Determination of daily discharge not sufficiently accurate to warrant publication prior to April 1, 1920.

COOPERATION.—Gage-height record furnished by United States Reclamation Service.

[1] Discharge at Avalon dam; reported by engineers of United States Reclamation Service.

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Discharge measurements of Pecos River at Carlsbad, N. Mex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Nov. 8	A. K. Gowans	1.30	82.6	Feb. 12	J. R. Yates	0.83	107
1919.				Mar. 13	do	.78	91.8
Jan. 15	do	1.46	136	Apr. 2	do	.80	96.9
Aug. 18	Ellsworth and Dudley	.97	156	May 4	do	.74	79.8
Sept. 19	United States Reclamation Service engineers.	12.5	[a]23,600	28	do	.87	126
				Aug. 6	do	.82	113
20	do	9.1	12,100	Sept. 3	do	.68	74.5
21	do	7.0	7,750	29	do	.74	101

[a] Meter broke when measurement was about half completed. Discharge in remainder of section estimated by comparison with measurements made Sept. 20 and 21.

NOTE.—Velocity observations for measurements of Sept. 19, 20, and 21, 1919, taken at 0.2 depth; coefficient of 1.00 used to reduce to mean velocity and is subject to error.

Daily discharge, in second-feet, of Pecos River at Carlsbad, N. Mex., for the period Apr. 1, 1919, to Sept. 30, 1920.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	124	112	112	105	114	86	16	112	124	112	105	102	94
2	124	112	102	105	124	86	17	112	112	320	110	100	96
3	124	112	102	105	122	82	18	112	112	436	128	100	94
4	124	112	510	105	114	86	19	112	112	311	141	98	92
5	124	112	628	107	112	84	20	124	112	112	146	98	98
6	124	112	478	105	102	90	21	112	124	110	119	100	96
7	124	112	234	105	98	86	22	112	124	102	114	94	96
8	138	112	2,120	114	96	90	23	112	124	107	110	94	96
9	138	112	2,320	110	96	88	24	112	124	105	106	92	98
10	138	112	164	102	98	90	25	112	124	100	102	92	96
11	124	112	221	102	98	94	26	112	112	94	102	92	96
12	124	112	494	107	96	92	27	112	112	96	107	96	102
13	124	112	161	100	100	98	28	124	124	119	112	98	102
14	124	124	778	105	100	96	29	112	124	110	107	96	100
15	112	124	256	105	100	94	30	112	124	110	102	96	100
							31	.....	124	.....	112	90	.....

NOTE.—Gage heights partly estimated June 8-10, 1920. Discharge interpolated July 1-3, 22-24, and Aug. 11-14, 1920. Daily discharge Oct. 1, 1919, to March 31, 1920, not sufficiently accurate for publication.

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Monthly discharge of Pecos River at Carlsbad, N. Mex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	92	51	68.3	4,200
November	94	39	62.5	3,720
December	129	52	90.8	5,580
January	249	75	128	8,480
February	383	57	188	10,400
March	23,600	85	2,420	149,000
April	6,250	79	1,640	97,600
May	5,240	79	995	61,200
June	5,740	100	886	52,700
July	3,820	100	1,000	61,500
August	297	136	201	12,400
September	23,600	126	4,380	261,000
The year	23,600	39	1,000	728,000
1919-20.				
October	5,910	152	1,310	80,600
November	335	124	200	11,900
December	1,130	124	244	15,000
January	930	124	252	15,500
February	3,520	124	517	29,700
March	.....	.....	e147	9,040
April	138	112	120	7,140
May	124	112	117	7,190
June	2,320	94	368	21,900
July	146	100	110	6,760
August	124	90	100	6,150
September	102	82	93.3	5,550
The year	5,910	82	300	216,000

e Partly estimated. See footnote to daily-discharge table.

PECOS RIVER NEAR MALAGA, N. MEX.

LOCATION.—In sec. 18 or 19, T. 24 S., R. 29 E., 3½ miles southeast of Malaga, Eddy County, and 4¼ miles below mouth of Black River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 1 to September 30, 1920.

GAGE.—Friez water-stage recorder, installed on right bank with staff gage attached to stilling well; inspected by W. F. Gerlach.

DISCHARGE MEASUREMENTS.—Made from cable.

CHANNEL AND CONTROL.—Bed composed of solid rock covered with sand; shifts. Right bank solid rock and steep. Left bank sand and high. Control is a rock ledge overlain with sand, 500 feet below gage. Shifts slightly.

EXTREMES OF DISCHARGE.—Maximum stage during period of record from water-stage recorder, 8.2 feet at 3 a. m. June 9 (discharge, 2,340 second-feet, determined from extension of rating curve); minimum stage, 3.63 feet at 8 p. m. September 1 (discharge, 63 second-feet, determined from extension of rating curve), caused by storage at Public Utilities power dam.

In September, 1919, the river reached a stage of 26.4 feet (discharge not determined.)

ICE.—None.

DIVERSIONS.—The Carlsbad project of the United States Reclamation Service, with reservoirs of a capacity of 58,500 acre-feet, diverts a large part of the natural run-off above Carlsbad, N. Mex. During the season of irrigation, considerable water is returned to the stream by seepage from lands in the vicinity of Carlsbad. In addition to the water used by the Carlsbad project, some diversions are made for irrigation in the basin above the storage reservoirs of the Carlsbad project.

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REGULATION.—The operation of a water-power plant of 300 horsepower capacity above station, just below Carlsbad, N. Mex., owned and operated by Carlsbad Electric Light & Power Co., does not materially regulate flow at gage. The flow is, however, regulated to a large extent by waters stored in the reservoirs of the Carlsbad project. In the season of irrigation the effect of the regulation is decreased by return seepage waters, but during the winter the flow depends on water released at the reservoirs.

ACCURACY.—Stage-discharge relation not permanent. Rating curve used May 1 to July 20 well defined between 140 and 680 second-feet, and extended above; parallel curve used from July 21 to September 30. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Mean daily gage heights determined from recorder graph by inspection, or by use of planimeter. Daily discharge ascertained by applying mean daily gage height to rating table, by shifting-control method, or for days of considerable fluctuation by applying gage heights for fractional parts of a day to rating table. Records good.

COOPERATION.—Base data furnished by the United States Reclamation Service.

Discharge measurements of Pecos River near Malaga, N. Mex., during the year ending Sept. 30, 1920.

[Made by J. R. Yates.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 1	3.97	151	June 19	5.25	678	Sept. 4	4.08	215
8	4.05	160	26	4.00	142	18	4.08	214
29	4.21	227	July 24	4.12	206			

Daily discharge, in second-feet, of Pecos River near Malaga, N. Mex., for the year ending Sept. 30, 1920.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	126	252	188	164	86	16	169	521	180	213	194
2	126	236	162	150	186	17	150	348	188	293	213
3	123	188	140	172	225	18	140	709	196	459	198
4	130	249	176	168	190	19	123	680	265	309	175
5	140	1,080	184	198	154	20	105	424	315	340	213
6	151	622	154	164	164	21	105	268	548	357	245
7	162	672	136	147	186	22	190	260	265	428	233
8	169	568	133	158	179	23	123	236	213	321	213
9	180	2,120	143	217	168	24	117	216	209	293	205
10	173	789	244	154	168	25	260	200	257	273	194
11	130	376	216	150	201	26	284	154	249	245	186
12	105	716	208	183	209	27	264	150	249	229	205
13	107	454	188	161	198	28	180	192	217	233	198
14	216	649	192	161	213	29	212	216	198	229	213
15	341	844	180	161	213	30	240	212	194	221	205
						31	268	.....	190	168	.....

NOTE.—Indirect method for shifting control used May 1–4, and Aug. 18 to Sept. 28. Discharge interpolated May 5–7. Gage height partly estimated May 4 and 8. Discharge obtained by averaging discharge for fractional parts of days: May 14, 15, 22, June 4–10, 12–16, 18, 20, July 19–21, and Aug. 18 and 20

Monthly discharge of Pecos River near Malaga, N. Mex., for the year ending Sept. 30, 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May	341	105	171	10,500
June	2,120	150	487	29,000
July	548	133	212	13,000
August	459	147	230	14,100
September	245	86	194	11,500
The period	.....	.....	.....	78,100

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PECOS RIVER NEAR ANGELES, TEX.

LOCATION.—In T. 26 S., R. 29 E., just below Pecos Valley Railroad bridge crossing Delaware Creek at its mouth, 2 miles north of New Mexico-Texas State line, 2¼ miles southeast of Red Bluff, Eddy County, N. Mex., and 8½ miles northwest of Angeles, Reeves County, Tex.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 27, 1914, to September 30, 1920.

GAGE—Stevens continuous water-stage recorder, at first outcropping of rock on the right bank about 600 feet below railroad bridge and mouth of Delaware Creek inspected by T. A. Ezell, R. T. Ezell, B. B. Dickson, and H. N. White.

DISCHARGE MEASUREMENTS.—Made by wading or from cable half a mile downstream.

CHANNEL AND CONTROL.—Bed and banks composed of sand, gravel, and rock; banks not subject to overflow. Control formed by a series of rapids 200 feet below gage; shifts.

EXTREMES OF DISCHARGE.—Maximum stage from water-stage recorder, during year ending September 30, 1919, 10.1 feet at 5 a. m. September 20 (discharge, 22,400 second-feet); minimum stage, 0.30 foot at 8 p. m. February 27 (discharge, 80 second-feet).

Maximum stage from water-stage recorder during year ending September 30, 1920, 4.47 feet at 3.30 a. m. October 13 (discharge, 5,490 second-feet); minimum stage not determined as it occurred during period when recorder was not working properly.

1914–1920: Maximum stage 21.5 feet at 10 a. m. August 8, 1916, measured by leveling from flood marks (discharge not determined); minimum discharge, February 27, 1919 (see above).

ICE.—Stage-discharge relation not seriously affected by ice; open channel rating assumed applicable.

DIVERSIONS.—The Carlsbad project of the United States Reclamation Service, with reservoirs of a capacity of 58,500 acre-feet, diverts a large part of the natural run-off above Carlsbad, N. Mex. During the season of irrigation, considerable water is returned to the stream by seepage from lands in the vicinity of Carlsbad. In addition to the water used by the Carlsbad project, some diversions are made for irrigation in the basin above the storage reservoir of the Carlsbad project.

REGULATION.—The operation of a water-power plant of 300 horsepower capacity above station, just below Carlsbad, N. Mex., owned and operated by Carlsbad Electric Light & Power Co., does not materially regulate flow at gage. The flow is, however, regulated to a large extent by water stored in the reservoirs of the Carlsbad project. In the season of irrigation the effect of the regulation is decreased by return seepage water, but during the winter the flow depends on water released at the reservoirs.

ACCURACY.—Stage-discharge relation assumed to have changed during flood beginning March 23, 1919, and changed slightly in 1920. Rating curves well defined for all stages. Operation of water-stage recorder not satisfactory considerable of the time owing principally to silt in float well, as indicated in footnote to daily-discharge table. From October 1, 1918, to September 30, 1919, daily discharge ascertained by applying to rating table mean daily gage heights determined from gage-height graph by inspection, or by planimeter; and from October 1, 1919, to September 30, 1920, by discharge integrator, except as noted in footnote to daily-discharge table. Records good, except when recorder was not operating properly

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Discharge measurements of Pecos River near Angeles, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Nov. 7	A. K. Gowans	0.47	133	Sept. 20	C. E. Ellsworth	8.66	[a]16,700
				21	do	6.25	9,560
1919.				Nov. 27	D. A. Dudley	.40	214
Jan. 14	do	.55	182				
Mar. 20	R. J. Hank	.58	189	1920.			
June 12	do	1.20	745	Feb. 24	do	.46	244
Aug. 16	Ellsworth and Dudley	.52	231	Mar. 18	do	.40	220
19	do	.50	232	Apr. 15	do	.30	157
Sept. 18	C. E. Ellsworth	3.85	4,110	May 19	do	.25	153
19	do	6.48	[a]10,200	June 23	do	.38	215
19	do	7.20	[a]12,800	July 24	do	.39	216
20	do	9.28	[a]19,600	Sept. 24	do	.36	200
20	do	9.02	[a]18,400				

[a] Surface velocity observed and coefficient of 0.85 used to reduce to mean velocity.

Daily discharge, in second-feet, of Pecos River near Angeles, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	147	151	225	147	244	110	1,530	2,080	990	900	314	258
2	135	147	218	147	257	114	2,780	2,060	1,550		245	258
3	126	151	225	143	257	139	3,670	1,710	990	562	262	266
4	135	143	200	156	251	162	1,960	1,910	1,280	2,640	245	262
5	135	139	173	151	264	183	1,610	1,190		745	910	245
6	135	135	131	147	270	189	1,510	632		314	396	245
7	147	139	135	147	285	194	930	476		436	1,220	249
8	135	147	135	151	285	225	880	363	1,300	3,370	1,400	294
9	156	151	110	151	300	205	1,100	330		2,490	1,370	309
10	156	151	118	143	308	189	2,660	990		1,390	597	274
11	147	173	126	151	285	200	1,470	1,270		1,040	698	253
12	143	162	156	162	238	200	2,360	802		304	320	258
13	147	167	167	178	285	183	1,700	1,470	1,420	294	356	258
14	143	167	173	189	212	126	476	3,750	2,730	641	309	245
15	143	167	178	183	293	114	1,330	1,090	4,280	299	274	270
16	156	156	183	167	194	131	764	1,420	1,530	632	270	3,420
17	151	162	178	178	183	156	330	940	2,740	314	320	12,100
18	139	162	183	194	173	194	330	2,570	1,580	1,090	245	4,820
19	151	162	218	205	162	231	330	1,210	2,680	502	249	10,900
20	151	151	231	212	151	200	330	562	1,300	3,500	299	15,500
21	167	156	257	231	143	194	330	396	2,670	4,060	245	10,100
22	173	162	270	251	135	1,160	330	363		3,020	241	6,530
23	194	162	270	264	126	6,160	337	1,960		1,630	237	4,560
24	178	189	264	270	118	12,300	343	2,150		493	241	4,880
25	162	231	264	427	110	21,000	330	650		1,430	270	4,530
26	162	183	257	489	104	13,300	325	562	1,900	1,310	270	2,880
27	167	183	257	386	101	6,200	1,910	1,190		1,190	258	707
28	151	156	231	251	110	3,400	3,870	3,770		1,160	258	900
29	135	147	173	218	.....	2,020	3,270	990		1,280	258	970
30	143	315	151	212	.....	1,660	4,330	840		890	253	1,060
31	143	.....	151	225	.....	1,550	.....	840		890	245	.....

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Daily discharge, in second-feet, of Pecos River near Angeles, Tex., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	1,380	1,340	435	1,100	352	223	173	181			221	207
2	524	338	370	614	664	194	172	172			215	173
3	290	244	360	350	390	628	174	180			210	220
4	267	229	370	333	1,280	302	175	184			215	255
5	761	275	369	967	399	421	177	190	410		218	246
6	978	312	357	292	1,300	310	178	195			222	234
7	1,400	314	270	223	388	224	180	194			212	234
8	585	723	227	225	297	450	182	216			197	255
9	335	300	242	220	911	350	183	225	2,310		211	249
10	805	240	278	220	359	548	185	225	1,600		222	272
11	1,050	220	320	514	539	335	186	207	494		197	265
12	4,190	245	304	864	981	229	188	195	550	250	220	215
13	4,540	254	351	372	867	415	198	190	852		205	217
14	2,410	295	356	1,280	588	319	193	214	535		200	215
15	1,400	277	352	787	322	211	177	317	1,030		195	212
16	1,040	364	358	327	226	194	177	309	601		219	225
17	1,430	535	358	319	586	566	179	218	311		278	221
18	1,140	292	362	317	278	244	184	188	413		314	219
19	354	322	366	313	184	231	195		623		403	215
20	1,030	390	363	765	630	395	214		536		274	218
21	342	318	360	848	315	333	193		280		365	263
22	1,090	369	348	1,000	215	229	197		234		340	286
23	322	345	348	378	754	213	209		228		369	240
24	1,110	284	348	1,210	281	204	194	200	217	223	303	205
25	713	260	288	391	588	182	191		200	252	282	193
26	1,070	292	247	1,040	334	181	200		198	258	267	196
27	317	268	1,040	420	236	180	200		207	238	245	196
28	1,100	228	334	318	578	178	205		233	242	240	646
29	321	224	238	892	284	177	188		686	239	236	400
30	254	441	211	401	.....	176	186		300	230	237	300
31	1,610	.....	236	588	.....	174	.....	.....	.....	232	240	.....

NOTE.—On account of unsatisfactory operation of the recorder, mean daily gage heights were estimated Dec. 13-15, 1918; and Jan. 12-13, Feb. 17-26, Apr. 14, May 4-13, 15, 19-31, June 1-4, July 12-19, 24-31, Aug. 1, and 12-16, 1919. Discharge estimated or interpolated: June 6-12, June 22-30, and July 1-2, 1919; Mar. 26-31, Apr. 1, 3-11, May 19 to June 8, July 1-23, Sept. 10, 11, 29, and 30, 1920, by comparison with records on Pecos River at Malaga, N. Mex., and from incomplete gage graph. Braced figures show estimated mean discharge for period included.

Monthly discharge of Pecos River near Angeles, Tex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	194	126	150	9,220
November	315	135	166	9,880
December	270	110	194	11,900
January	489	143	211	13,000
February	308	101	209	11,600
March	21,000	110	2,340	144,000
April	4,330	325	1,450	86,300
May	3,770	330	1,310	80,600
June	.....	990	1,770	105,000
July	4,060	294	1,280	78,700
August	1,400	237	422	25,900
September	15,500	245	2,930	174,000
The year	21,000	101	1,040	750,000

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Monthly discharge of Pecos River near Angeles, Tex., for the years ending Sept. 30, 1919 and 1920—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919–20.				
October	4,540	254	1,100	67,600
November	1,340	220	351	20,900
December	1,040	211	347	21,300
January	1,280	220	577	35,500
February	1,300	184	522	30,000
March	628	174	291	17,900
April	214	172	188	11,200
May	.....	.....	206	12,700
June	2,310	.....	531	31,600
July	.....	.....	247	15,200
August	403	195	251	15,400
September	646	173	250	14,900
The year	4,540	.....	405	294,000

PECOS RIVER ABOVE BARSTOW, TEX.

LOCATION.—Three-quarters of a mile below headgate of Biggs irrigation project, 1 mile east of Patrole siding on Pecos Valley Railway, 1¼ miles above headgate of Barstow Irrigation Co., 14 miles northwest of Barstow, Reeves County, and 10 miles northwest of Pecos.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—February 1, 1916, to September 30, 1920.

GAGE.—Stevens water-stage recorder on right bank, inspected by W. G. Paddock and C. E. Armstrong.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 150 feet below gage.

CHANNEL AND CONTROL.—Channel straight 100 feet above and 300 feet below station. Bed composed of gravel, clay, and sand; not permanent. Right bank is clay, clean, and fairly permanent; left bank loose and covered with salt cedar; banks are overflowed at gage height about 10 feet. Shoal 250 feet below gage serves as control; shifts during high water.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, occurred during the period, September 20–23, for which no reliable record is available. Flood marks indicate a maximum of about 12 feet. Minimum stage from water-stage recorder 1.20 feet October 2 (discharge, 63 second-feet).

Maximum stage from water-stage recorder during year ending September 30, 1920, 10.65 feet at 10 p. m. October 14 (discharge, 4,000 second-feet); minimum stage occurred during period of missing record.

1915–1920: Maximum stage from water-stage recorder 12.1 feet at 6 a. m. August 10, 1916 (discharge not measurable above a stage of about 11 feet because of water overflowing banks); minimum discharge 22 second-feet, June 24, 1917.

ICE.—None reported.

DIVERSIONS.—In addition to water used in New Mexico by the Carlsbad and other projects, several large diversions are made above the station in Texas. The principal projects in Texas which divert above the station are the Arno, Porterville, Farmers Independent, and Biggs. According to the records of the Board of Water Engineers for the State of Texas, these projects have declared a total of about 7,500 acres irrigated. The principal projects below the station are the Barstow, Grandfalls, Imperial, and Zimmerman which have declared a total irrigated area of about 30,000 acres.

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REGULATION.—Storage in connection with the Carlsbad project controls the run-off during parts of the year. The operation of a water-power plant of 300 horsepower capacity, below Carlsbad, does not affect the flow at this point.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve well defined below 500 second-feet, and fairly well defined to 4,000 second-feet. Operation of water-stage recorder not satisfactory, principally because of silt in float well, and insufficient attendance. Mean daily gage heights determined by inspecting recorder graph, or by planimeter. Daily discharge, October 1, 1918, to September 27, 1919, ascertained by applying mean daily gage height to rating table and from September 28, 1919, to September 30, 1920, by indirect method for shifting control except as otherwise indicated in footnote to daily-discharge table. Records April 1 to September 30, 1919, poor; fair for other periods.

Discharge measurements of Pecos River above Barstow, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Nov. 9	A. K. Gowans	1.49	85.4	Jan. 9	D. A. Dudley	2.80	277
1919.				Feb. 23	do	3.05	293
				Mar. 17	do	2.16	178
Jan. 12	do	2.08	136	Apr. 14	do	1.21	89.2
Mar. 20	R. J. Hank	1.90	119	May 18	do	1.84	166
30	do	8.48	2,500	June 22	do	2.56	267
June 12	do	6.10	1,400	July 22	do	.87	72.6
Aug. 15	C. E. Ellsworth	3.05	271	Sept. 22	do	1.07	94.9
20	D. A. Dudley	2.33	170				
Nov. 26	do	2.71	275				

Daily discharge, in second-feet, of Pecos River above Barstow, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	64			138			1,570	3,450				114
2	63			129			912	2,350				112
3	66			128			2,470	2,380	1,730			114
4	74			136			3,520	2,170				114
5	71			140			1,450	1,740				129
6	69	89		141			589	1,400				131
7	70			138			1,420					130
8	71			136			924					117
9	74	82		127			520					116
10		82		133			1,040					146
11		84		139			2,500					151
12		90		138			1,840	1,380	1,280			124
13		100		150			2,680	765	1,230			129
14		108		156			1,790	1,330	1,630			124
15		122		163				3,140	2,900		265	124
16		120						1,430	3,440		251	443
17		114						1,580	2,000		238	3,000
18		108						1,040	2,720		249	4,190
19		94						2,490	2,050		189	4,190
20		90			168	121		1,600	2,840		167	
21		80				143			1,730		164	
22						144	203		2,720		157	
23						1,400	193		1,430		151	
24						3,820	193	1,730	1,940		148	4,260
25						4,260	190	1,480	1,940		147	4,120
26						4,560	190		1,480		140	4,000
27						4,550	193		1,430		134	3,200
28			176			4,090	1,380	1,230			129	1,570
29						3,440	3,250	3,080			124	1,300
30			164			2,640	3,120	1,280	360		119	1,320
31			146			1,620		1,000			114	

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Daily discharge, in second-feet, of Pecos River above Barstow, Tex., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	1,370	1,570	310			414					117	166
2	2,200	1,370	462								117	166
3	1,420	574	426								110	
4	723	410	403								103	
5	514	345	403			392					101	
6	793	335	403								110	
7	1,170	366	392								113	
8	1,620	377	339								116	
9	872	670	310	291							110	
10	559	433	300	291							104	
11	832		329	291							107	
12	1,170		350	339							163	
13	3,550		350	900							265	
14	3,670		370	505							173	
15	3,070		370	1,110			93				120	
16	1,820		360	880				98			124	
17	1,570		350			185		335			137	
18	1,670	514	350			257		164			155	
19	1,520	388	339			370		117			221	
20	723	315	339			236					252	
21	1,320	410	339			222					284	
22	1,370	356	291	1,040		339			282	82	215	98
23	1,130	335	339	980	282	241				156	265	95
24	574	377			565	193				111	260	98
25	1,130	339		1,020	414						279	91
26	872	291			426						230	89
27	1,220	291			426						228	87
28	589	310									193	87
29	1,130	274									175	
30	688	255							310	136	167	
31	723									122	167	

NOTE.—No gage-height record for days for which discharge is not given. Discharge partly estimated on following dates. Oct. 17–23, Nov. 6, 22–24, 26, 1919; Jan. 9, 22, 23, 25, Feb. 23–27, Mar. 1, 5, 17, May 16 July 22, July 30 to Aug. 19, and Sept. 22, 1920. Discharge from staff gage reading on following dates: Dec. 18, 1918, Feb. 20, June 30, 1919, Nov. 25, Apr. 14, and June 22, 1920.

Monthly discharge of Pecos River above Barstow, Tex., for the year ending Sept. 30, 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	3,670	514	1,340	82,400
August	284	101	170	10,500

NOTE.—Records too fragmentary to permit computation of discharge for other months.

PECOS RIVER NEAR GRANDFALLS, TEX.

LOCATION.—At site of old highway bridge where Grandfalls–Fort Stockton road formerly crossed Pecos River, 1½ miles upstream from present Grandfalls–Fort Stockton road crossing at Iron Bridge, 2 miles below diversion dam for silt-line canal of Imperial Irrigation Co., 3 miles south of Grandfalls, Ward County, 4½ miles above diversion dam of Zimmerman project, and 21 miles south of Monahans.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 6, 1915, to September 30, 1920. Records were taken at Iron Bridge, 1½ miles downstream, from November 6, 1915, to August 3, 1917. Discharge at both points believed to be the same.

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GAGE.—Stevens water-stage recorder, installed August 9, 1917, on downstream side of old bridge pier near left water's edge; inspected by A. J. Adcock. Prior to August 3, 1917, a Stevens water-stage recorder at Iron Bridge. Backwater from Zimmerman dam compelled the relocation of the station.

DISCHARGE MEASUREMENTS.—Made by wading near gage, from cable 50 feet above gage, or during extremely high stages, at Iron Bridge.

CHANNEL AND CONTROL.—Bed of stream clean, smooth, solid rock, and permanent, except small deposits of sand and gravel. Channel straight for 100 feet above and below station. One channel below gage height of 8 feet; above this stage, both banks, which are dirt and wooded, subject to overflow. Rock ledge extending diagonally across stream just below gage serves as low-water control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, from water-stage recorder 9.6 feet from 2 to 6 a. m. September 25 (discharge, 13,000 second-feet); minimum discharge, approximately 3 second-feet from March 16–21.

Maximum stage from water-stage recorder during year ending September 30, 1920, 5.7 feet October 16 (discharge, 2,580 second-feet). Minimum stage during year from water-stage recorder, 0.52 foot from 1 to 6 p. m. July 23 discharge, 13 second-feet). A lower stage may have been reached during periods of missing records.

1915–1920: Maximum stage in 1919 (see above); minimum discharge less than 0.7 second-foot April 17, 1916.

ICE.—None.

DIVERSIONS.—Station is 2 miles below diversion of silt-line canal of the Imperial Irrigation Co., 15½ miles below diversion for Grandfalls project, 18½ miles below diversion for the Imperial reservoir (17,000 acre-feet capacity), and 4½ miles above diversion for Zimmerman project. Available data show that tracts aggregating approximately 143,000 acres are irrigable between station and lower limits of Carlsbad project of United States Reclamation Service. Records of Board of Water Engineers for the State of Texas show that about 58,000 acres are declared irrigated in Texas above station. The effect of diversions is somewhat counterbalanced by water returned to stream by seepage. The only diversion of importance below the station is that for the Zimmerman project which has declared an irrigated area of 2,005 acres.

REGULATION.—Slight effect caused by operation of storage reservoirs on Carlsbad project.

ACCURACY.—Stage-discharge relation appears to be practically permanent for high stages, but measurements indicate that the low-stage control shifts considerably. Standard rating curve well defined for all stages. Operation of water-stage recorder unsatisfactory. Mean daily gage heights obtained by inspecting gage-height graph, or for days of considerable fluctuation by use of planimeter. Daily discharge ascertained by applying mean daily gage height to rating table, March 19 to September 30, 1919, and January 1 to February 8, 1920; by shifting-control method the remainder of period except as indicated in footnote to daily-discharge table. Records excellent when water-stage recorder was operating satisfactorily and poor for other periods.

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Discharge measurements of Pecos River near Grandfalls, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
1918.				1919.			
Nov. 5	A. K. Gowan	0.65	11.5	Oct. 6	A. J. Adcock	2.33	667
				Nov. 24	Dudley and Adcock	2.20	541
1919.				1920.			
Jan. 11	do	.48	9.8	Jan. 8	D. A. Dudley	2.30	627
Mar. 19	R. J. Hank	.39	3.0	Feb. 21	do	1.61	279
29	do	9.30	[a] 12,600	Mar. 16	do	1.32	178
30	do	8.20	[b] 6,390	Apr. 13	do	.60	16.4
31	do	6.55	[c] 3,270	May 17	do	.69	31.2
June 11	do	2.84	954	June 21	do	.69	34.1
Aug. 14	Ellsworth and Dudley	1.58	253	July 21	do	.62	24.0
21	do	.97	75	Sept. 21	do	.97	80.8
Sept. 24	C. E. Ellsworth	8.55	[d] 7,110				
25	do	9.60	[d] 11,800				

[a] Surface velocity observed; coefficient of 0.87 used to reduce to mean velocity.
[b] Surface velocity observed; coefficient of 0.85 used to reduce to mean velocity.
[c] Surface velocity observed; coefficient of 0.88 used to reduce to mean velocity.
[d] Surface velocity observed; coefficient of 1.05 used to reduce to mean velocity.

Daily discharge, in second-feet, of Pecos River near Grandfalls, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	14	13	16	9		22	1,500	1,790	570	224		
2	13	12	16	9		18	1,320	1,980		576	450	
3	14	12	16	9		13	1,010	1,930		1,330		
4	14	12	16	9		9	1,490	1,580		1,060	221	
5	13	12	17	9	30	4	2,180	1,330	1,500	718	151	
6	13	14	18	9		4	2,170	1,380		1,470	104	
7	13	12	19	9		4	960	1,190	1,010	812	175	
8	13	9	19	9	88	4	1,140	680		400	267	
9	15	8	19	9	85	4	933	524	1,000	405	410	70
10	16	10	15	9	82	4	894	368		1,720	796	
11	18	10	11	10	79	4	1,010	212	928	1,610	834	
12	22	9	8	10	76	4	1,550	265	559	1,180	365	
13	18	9	6	10	72	4	1,470	365	691	894	365	
14	19	9	6	10	69	4	1,710	360	790	520		
15	17	9	6	10	66	4	1,680	559	1,020	325		
16	16	10	6	9	65	3	757	1,060	1,050	350	150	
17	16	10	6	9	64	3	900	1,200	1,900	440		1,000
18	16	10	6	9	62	3	818	1,080	1,800	265		
19	17	10	6	9	60	3	415	916	1,620	345		2,140
20	19	10	7	9	58	3	280	735	1,630	375		2,350
21	16	11	7	9	56	3	254	480	1,710	702	76	2,750
22	16	12	7	9	54	4	242	295	1,380	1,610		3,390
23	16	12	7	9	52	20	227	265	1,630	1,820		3,920
24	16	12	8	9	50	365	202	305		1,870		6,980
25	15	13	8	9	45	1,660	187	305		1,340		12,300
26	16	14	8	9	40	2,000	187	310	1,500		80	8,250
27	15	14	9	9	36	2,630	187					5,360
28	17	15	9	9	31	3,790	175			850		4,620
29	17	15	9	9	.....	10,500	669	800				3,290
30	16	15	9	9	.....	6,740	1,540		365			1,550
31	15	.....	9	9	.....	3,080	.....		.....			.....

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Daily discharge, in second-feet, of Pecos River near Grandfalls, Tex., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	1,450	988	.....	390	669	125	13	19	52	169	.....	136
2	1,480	1,540	.....	335	500	175	14	18	45	178	.....	.....
3	1,770	1,510	.....	553	576	157	15	18	45	187	.....	.....
4	1,480	988	.....	834	465	117	15	18	52	190	.....	.....
5	906	751	.....	598	598	112	16	19	56	193	.....	.....
6	664	614	.....	515	801	227	16	19	68	193	18	.....
7	1,040	543	.....	834	691	160	18	18	83	196	18	.....
8	.....	537	.....	658	971	172	17	17	145	199	17	.....
9	.....	548	.....	490	.....	184	18	18	184	193	17	.....
10	.....	691	.....	420	.....	142	18	19	181	193	.....	.....
11	.....	686	.....	455	.....	181	17	20	.....	193	.....	93
12	.....	520	.....	475	.....	202	16	18	.....	.....	.....	.....
13	.....	430	.....	460	.....	270	16	16	.....	.....	.....	.....
14	.....	380	.....	856	.....	218	28	16	.....	.....	.....	.....
15	.....	380	.....	762	.....	166	70	25	.....	.....	.....	.....
16	2,580	380	.....	982	.....	181	70	25	.....	.....	.....	.....
17	2,280	390	.....	1,060	.....	175	66	32	.....	.....	.....	.....
18	1,580	410	455	696	.....	91	58	37	.....	.....	.....	.....
19	1,490	485	475	542	.....	56	60	39	.....	.....	.....	.....
20	1,320	570	470	490	.....	139	58	43	.....	20	.....	.....
21	928	475	465	475	275	106	58	41	35	23	.....	78
22	1,100	537	460	542	280	68	60	50	106	50	.....	.....
23	856	576	455	933	450	86	58	58	122	15	.....	.....
24	1,100	554	455	960	235	96	58	52	125	18	.....	.....
25	867	614	450	686	250	32	56	43	131	18	.....	.....
26	1,070	610	455	906	320	22	58	41	136	.....	.....	63
27	980	548	435	716	187	18	43	50	139	.....	.....	63
28	1,400	470	405	790	246	16	25	39	148	.....	.....	60
29	1,060	455	641	716	166	16	19	37	157	.....	.....	58
30	1,500	450	625	537	.....	16	19	43	163	.....	.....	169
31	1,200	.....	465	592	.....	13	.....	52	.....	.....	.....	.....

NOTE.—Discharge interpolated: Jan. 17-21, 23-30, Feb. 9-14, 16-23, 25-28, Mar. 1-4, 6-10, 12-18, May 9 and 10, 1919. Discharge estimated: Feb. 1-7, May 27-30, June 2-6, 8-10, 24-29, July 26-31, Aug. 1-3, 14-20, 22-31, Sept. 1-16, 17 and 18, 1919; estimated discharge obtained by comparison with records of flow at other stations and are probably fairly accurate. Gage-height record estimated wholly, or in part, for following periods: Nov. 18 to Dec. 28, 1918; May 23-26, 1919, and July 8-11, 1920. Discharge for following days determined from readings of staff gage: Jan. 22, 31, Feb. 8, 15, 24, Mar. 5, 11, June 1, 7, Aug. 21, 1919; Sept. 1, 11, and 21, 1920. Braced figures show mean discharge for periods included.

Monthly discharge of Pecos River near Grandfalls, Tex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	22	13	15.8	972
November	15	8.0	11.4	678
December	19	6.0	10.6	652
January	10	9.0	9.16	563
February	.....	.....	53.5	2,970
March	10,500	3.0	997	61,300
April	2,180	175	935	55,600
May	.....	212	821	50,500
June	.....	365	1,270	75,600
July	1,870	224	886	54,500
August	834	.....	221	13,600
September	12,300	.....	1,990	118,000
The year	12,300	3.0	601	435,000
1919-20.				
November	1,540	380	621	37,000
December	641	405	479	13,300
January	1,060	335	653	40,200
March	270	13	121	7,440
April	70	13	35.8	2,130
May	58	16	31.0	1,910

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PECOS RIVER NEAR COMSTOCK, TEX.[1]

LOCATION.—At Pecos High Bridge of Galveston, Harrisburg & San Antonio Railway Co., 11 miles west of Comstock, Valverde County, 18 miles east of Langtry, 14 miles by stream above confluence with Rio Grande, and below all tributaries.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 1, 1900, to September 30, 1920. (Also gage heights for 1898.)

GAGE.—Vertical staff attached to downstream side of bridge pier on left bank; read by W. A. Clare.

DISCHARGE MEASUREMENTS.—Made from cable, 1,000 feet above bridge.

CHANNEL AND CONTROL.—Banks and stream bed composed of rock and gravel; water flows through a series of rapids and pools in a canyon approximately 300 feet deep; banks not subject to overflow. Stage-discharge relation at low stages changes slightly.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 30.00 feet at 10 a. m. September 16 (discharge, not determined); minimum stage, −0.02 foot October 6–9 (discharge, 126 second-feet).

Maximum stage recorded during year ending September 30, 1920, 5.8 feet at 5 p. m. October 4 (discharge, 5,220 second-feet); minimum stage, 0.40 foot on several days during July and August (discharge, 288 second-feet).

1900–1920: Maximum stage recorded, 35.75 feet April 6, 1900 (discharge not determined); minimum discharge recorded, 106 second-feet July 29 to August 1, 1918 (gage-height, −0.12 foot). Gage heights for low stages not comparable owing to shifting control.

ICE.—None.

DIVERSIONS.—Considerable water is diverted and stored above the station for irrigation. Lakes McMillan and Avalon of the Carlsbad project of the United States Reclamation Service, with a combined capacity of 58,500 acre-feet, are located on Pecos River a few miles above Carlsbad, N. Mex. In addition to the water stored in New Mexico, water from Pecos River is used to irrigate large areas of land in the vicinity of Barstow and Grandfalls, Tex. There are no diversions below the station. Return waters tend to equalize effects of diversions in lower part of drainage basin.

REGULATION.—Flow partly controlled by storage and diversions for irrigation above station. No water-power plants of any consequence operated in the drainage basin, except a public utility plant of about 300 horsepower, near Carlsbad, N. Mex.

ACCURACY.—Stage-discharge relation changed during period, October 10–24, 1918. Two curves used: One applicable from October 1–9, 1918, well defined for all stages, the other, applicable from October 25, 1918, to September 30, 1920, well defined from 260 to 13,000 second-feet, and fairly well defined to 40,000 second-feet. Gage read to hundredths twice daily from October 1, 1918, to September 30, 1919, and to half-tenths October 1, 1919, to September 30, 1920. Daily discharge ascertained by applying mean daily gage height to rating table except from October 10–24, 1918, when indirect method for shifting control was used. Records good.

Discharge measurements of Pecos River near Comstock, Tex., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 16	W. H. Dodd	0.30	261	May 14	D. A. Dudley	.73	400
May 10	do	2.40	1,460	14	do	.66	363
Aug. 23	Ellsworth and Dudley	1.17	579				
Sept. 22	D. A. Dudley	17.85	[a] 38,200				
23	do	7.78	[a] 8,910				

[a] Surface velocity observed and coefficient of 1.02 used to reduce to mean velocity.

[1] Records published in reports prior to 1915 under heading "Pecos River near Moorehead, Tex."

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Daily discharge, in second-feet, of Pecos River near Comstock, Tex., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	130	257	262	257	243	250	2,370	1,080	570	1,630	1,080	350
2	130	255	262	257	250	250	2,270	560	611	1,000	970	347
3	130	250	262	257	250	250	2,820	1,290	1,290	900	935	341
4	136	250	262	252	250	250	3,400	1,320	595	802	900	316
5	130	238	260	250	250	250	2,780	1,350	580	682	802	316
6	126	233	257	250	250	250	1,740	1,360	570	802	710	316
7	126	238	257	250	250	250	1,320	1,350	570	1,270	710	310
8	126	550	257	250	255	255	2,050	2,740	585	1,430	682	305
9	126	262	262	250	255	250	2,200	2,180	580	1,110	628	288
10	332	302	262	252	250	250	2,160	1,750	580	1,310	528	291
11	570	262	257	250	250	250	1,290	1,290	835	970	505	288
12	1,400	257	257	250	255	250	1,300	2,220	580	770	460	291
13	229	257	262	250	255	250	1,270	1,300	575	655	460	288
14	194	250	257	252	250	250	1,270	1,250	570	1,550	600	288
15	190	250	257	257	255	250	1,280	575	575	1,470	770	322
16	192	250	257	262	255	255	1,330	580	1,890	1,150	740	51,800
17	188	250	257	260	257	255	1,330	580	835	868	528	16,300
18	190	248	257	257	255	255	1,340	580	585	802	550	3,780
19	194	250	257	257	255	250	1,300	1,300	1,210	682	505	3,220
20	202	250	260	257	257	238	1,260	1,330	1,330	655	505	1,810
21	1,550	250	257	278	250	233	1,270	1,300	1,960	655	505	24,400
22	816	250	262	262	255	238	1,250	1,300	1,330	600	469	35,200
23	776	250	260	257	243	238	1,240	1,290	1,330	550	616	7,980
24	397	250	257	250	250	257	570	1,330	1,330	600	469	3,780
25	310	252	257	250	250	2,270	565	1,290	1,330	770	460	3,640
26	283	262	257	250	250	1,050	565	590	2,500	1,510	400	3,840
27	288	272	257	250	250	580	560	580	1,610	1,790	381	3,840
28	285	267	257	250	255	460	555	565	1,320	1,710	400	4,170
29	283	262	257	250	.....	740	550	565	1,330	6,000	378	5,080
30	267	283	257	243	.....	1,330	550	585	1,290	2,000	374	4,240
31	262	.....	257	250	.....	2,220	.....	575	.....	1,390	350	.....
1919-20.												
1	4,660	1,590	935	600	835	740	401	332	364	381	316	460
2	4,940	1,590	835	710	710	740	440	332	347	381	316	460
3	4,940	1,590	770	710	710	710	401	332	347	347	288	460
4	5,220	1,590	803	710	710	628	401	332	347	347	288	460
5	3,330	1,590	710	710	770	575	401	332	381	347	288	460
6	2,980	1,910	710	600	710	528	381	332	381	347	302	440
7	3,210	1,750	710	600	770	528	401	332	483	347	302	460
8	2,360	1,590	835	835	710	628	381	332	381	332	316	440
9	1,670	1,350	835	835	710	528	401	332	381	347	316	420
10	1,590	1,270	710	740	770	440	381	332	347	332	316	420
11	2,180	1,110	710	835	835	440	401	316	347	420	288	420
12	1,830	1,080	710	900	970	401	364	332	347	420	288	420
13	1,750	1,000	710	710	970	401	364	332	347	347	316	420
14	1,670	1,040	710	683	770	460	364	381	1,150	347	381	381
15	1,590	1,110	710	655	710	483	381	347	835	347	401	381
16	1,910	970	710	710	803	483	364	347	935	347	440	381
17	2,180	970	710	655	803	505	381	347	740	316	440	381
18	2,560	835	710	770	900	528	364	347	655	302	440	381
19	2,980	835	710	835	970	575	381	332	628	288	440	381
20	3,090	803	710	970	1,000	505	364	316	550	302	420	381
21	2,560	803	710	1,110	1,000	483	364	347	483	288	420	381
22	2,270	835	710	970	835	483	364	347	483	294	4,660	401
23	2,180	970	710	803	710	483	364	575	505	288	1,110	347
24	1,910	970	710	710	710	460	364	347	505	288	710	347
25	1,750	970	710	683	710	440	364	420	460	288	600	347
26	1,750	935	710	628	600	483	347	401	440	288	575	347
27	1,590	970	710	970	600	440	332	381	381	302	528	364
28	1,590	970	710	970	710	440	332	347	381	302	483	364
29	1,590	970	710	835	600	440	332	347	381	347	460	1,350
30	1,590	970	600	970	.....	460	347	347	381	347	460	565
31	1,590	.....	600	835	.....	483	.....	364	.....	332	460	.....

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Monthly discharge of Pecos River near Comstock, Tex., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	1,550	126	340	20,900
November	550	233	265	15,800
December	260	257	259	15,900
January	278	243	254	15,600
February	257	243	252	14,000
March	2,270	233	472	29,000
April	3,400	550	1,460	86,900
May	2,740	560	1,160	71,300
June	2,500	570	1,030	61,300
July	6,000	550	1,230	75,600
August	1,080	350	593	36,500
September	51,800	288	5,920	352,000
The year	51,800	126	1,100	795,000
1919–20.				
October	5,220	1,590	2,480	152,000
November	1,910	803	1,160	69,000
December	935	600	727	44,700
January	1,110	600	782	48,100
February	1,000	600	780	44,900
March	740	401	514	31,600
April	440	332	374	22,300
May	575	316	353	21,700
June	1,150	347	490	29,200
July	420	288	333	20,500
August	4,660	288	560	34,400
September	1,350	347	439	26,100
The year	5,220	288	751	544,000

Days of deficiency in discharge of Pecos River near Comstock, Tex., for the years ending Sept. 30, 1901–1920.

Discharge in second-feet.	Days of deficient discharge.									
	1900–1	1901–2	1902–3	1903–4	1904–5	1905–6	1906–7	1907–8	1908–9	1909–10
100										
150				45						
200	19		5	130			3		19	78
250	29	20	59	256			33	12	82	123
300	73	57	109	291			81	17	157	238
350	88	81	125	305			83	63	212	309
400	114	108	150	306			115	101	293	345
450	143	127	232	306		16	175	128	334	350
500	185	165	269	309		39	200	158	338	352
600	251	208	333	317	18	98	316	196	344	353
700	280	256	339	326	47	188	329	222	348	354
800	299	273	345	334	107	255	361	258	350	357
900	306	290	348	344	162	320	365	293	352	358
1,000	313	307	350	344	176	325		313	351	358
1,200	330	326	350	346	211	336		330	353	359
1,500	345	338	352	352	247	354		350	362	363
1,800	352	345	352	354	290	356		355	365	364
2,200	360	353	365	357	315	359		355		364
2,600	363	360		357	328	359		359		364
3,000	363	364		358	338	359		364		364
3,500	363	364		361	342	359		364		364
4,000	363	364		361	345	359		364		364
5,000	364	364		362	355	361		364		364
7,000	364	364		362	362	361		364		364
10,000	365	364		362	364	362		365		364
15,000		364		365	365	362		366		364
20,000		364		366		363				364
25,000		365				363				364
30,000						364				365
35,000						364				
37,000						365				

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Days of deficiency in discharge of Pecos River near Comstock, Tex., for the years ending Sept. 30, 1901–1920—Continued.

Discharge in second-feet.	Days of deficient discharge.									
	1910–11	1911–12	1912–13	1913–14	1914–15	1915–16	1916–17	1917–18	1918–19	1919–20
100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
150	.....	54	10	.....	.....	.....	28	50	9	.....
200	21	129	63	.....	.....	.....	123	260	15	.....
250	128	187	150	18	.....	65	185	347	28	.....
300	217	325	214	91	.....	121	220	356	171	12
350	264	363	255	130	.....	181	237	356	182	81
400	295	365	283	151	28	211	261	357	189	123
450	310	365	299	193	57	243	299	359	190	159
500	321	365	305	216	76	273	342	359	196	183
600	331	365	316	239	141	287	355	360	238	198
700	336	365	325	272	193	300	359	360	250	216
800	340	365	331	285	240	320	362	360	258	269
900	343	365	335	297	281	337	362	360	266	291
1,000	345	365	339	310	290	342	363	360	271	313
1,200	347	366	346	322	303	344	365	360	277	323
1,500	353	.....	352	331	321	353	.....	361	323	326
1,800	356	.....	353	339	331	359	.....	362	332	345
2,200	358	.....	357	347	333	362	.....	363	339	352
2,600	363	.....	359	352	337	364	.....	363	346	356
3,000	363	.....	359	353	344	364	.....	363	349	358
3,500	363	.....	359	355	346	364	.....	363	351	361
4,000	364	.....	360	356	350	364	.....	364	356	361
5,000	364	.....	361	360	354	364	.....	364	358	365
7,000	364	.....	362	361	361	364	.....	365	360	366
10,000	364	.....	362	365	362	365	.....	.....	361	.....
15,000	365	.....	362	.....	363	365	.....	.....	361	.....
20,000	.....	.....	365	.....	363	.....	.....	.....	362	.....
25,000	.....	.....	.....	.....	363	.....	.....	.....	363	.....
30,000	.....	.....	.....	.....	364	.....	.....	.....	363	.....
35,000	.....	.....	.....	.....	364	.....	.....	.....	363	.....
37,000	.....	.....	.....	.....	365	.....	.....	.....	364	.....
38,000	.....	.....	.....	.....	.....	.....	.....	.....	365	.....

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MISCELLANEOUS MEASUREMENTS.

Miscellaneous discharge measurements in Texas during the years ending Sept. 30, 1919 and 1920.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
1920.				*Feet.*	*Sec.-ft.*
Aug. 21	West Fork of Trinity River.	Trinity River	Fort Worth, Tex., below Clear Fork.	1.73	219
30	do	do	do	3.60	1,740
30	Trinity River	Trinity Bay	Dallas, Tex	25.70	6,700
31	do	do	do	27.17	7,630
Sept. 1	do	do	do	28.39	8,770
2	do	do	do	30.79	10,400
3	do	do	do	30.39	9,960
4	do	do	do	20.17	3,860
5	do	do	do	17.41	3,250
Aug. 30	Elm Fork of Trinity River.	Trinity River	Record crossing near Dallas, Tex.	10.63	6,200
31	do	do	do	11.75	6,560
Sept. 1	do	do	do	13.96	8,530
4	do	do	do	4.84	1,070
July 12	San Saba River	Colorado River	Dam site near Doran ranch, 20 miles above San Saba, Tex.		135
Mar. 6	Clear Creek	San Saba River	Near Menard, Tex		17.9
1919.					
Jan. 9	Noyes canal	do	do		2.2
1920.					
Mar. 6	do	do	do		17.2
26	do	do	do		17.9
June 1	do	do	do		8.4
July 10	do	do	do		18.7
1918.					
Oct. 30	Guadalupe River	Gulf of Mexico	½ mile south of Seguin, Tex.		328
31	do	do	1 mile south of Belmont, Tex.		313
1919.					
Feb. 9	San Marcos River	Guadalupe River	Martindale, Tex		205
9	do	do	Fentress, Tex		226
1918.					
Nov. 2	do	do	1 mile west of Fentress, Tex.		65.6
2	do	do	Highway bridge, 2 miles west of Luling, Tex.		76.4
1919.					
Feb. 9	Blanco River	San Marcos River.	San Marcos-Luling crossing		96.8
8	Plum Creek	do	Gonzales-Luling crossing		10.8
May 8	Salado Creek	San Antonio River	Just above Government well, Camp Travis, near San Antonio, Tex.		3.0
8	do	do	Below Government well and above Farmers well, Camp Travis, near San Antonio, Tex.		14.9
8	do	do	Just below Farmers well, Camp Travis, near San Antonio, Tex.		24.0
8	do	do	300 feet above confluence with San Antonio River, near San Antonio, Tex.		41.6
8	Government well	Salado Creek	Penstock outlet below turbine, Camp Travis, near San Antonio, Tex.		9.6
Aug. 23	Devils River	Rio Grande	Near Del Rio, Tex		381
20	San Solomon Spring	Pecos River	Near Balmorhea, Tex		34.7
20	Griffin Spring	do	do		3.9
20	Saragosa Spring	do	do		4.8
21	Fort Stockton Springs	do	Near Fort Stockton, Tex		44.5
1920.					
July 26	Leon Springs and wells	Pecos River	do		26.9
1919.					
Dec. 1	do	do	Near Fort Stockton, Tex., above well known as "Honey well."		20

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HUBERT WORK, Secretary

UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

WATER-SUPPLY PAPER 509

SURFACE WATER SUPPLY OF THE UNITED STATES

1919-1920

PART IX. COLORADO RIVER BASIN

NATHAN C. GROVER, Chief Hydraulic Engineer
ROBERT FOLLANSBEE, A. B. PURTON, and H. D. McGLASHAN
District Engineers

Prepared in cooperation with the
STATES OF ARIZONA, COLORADO, UTAH, and WYOMING

WASHINGTON
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1925

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SURFACE WATER SUPPLY OF COLORADO RIVER BASIN, 1919 AND 1920

AUTHORIZATION AND SCOPE OF WORK

This volume is one of a series of 14 reports presenting results of measurements of flow made on streams in the United States during the years ending September 30, 1919 and 1920.

The data presented in these reports were collected by the United States Geological Survey under the following authority contained in the organic law (20 Stat. L., p. 394):

Provided, That this officer [the Director] shall have the direction of the Geological Survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

The work was begun in 1888 in connection with special studies relating to irrigation in the arid West. Since the fiscal year ending June 30, 1895, successive sundry civil bills passed by Congress have carried the following item and appropriations:

For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

Annual appropriation for the fiscal years ended June 30, 1895–1921

1895	$12, 500. 00
1896	21, 000. 00
1897 to 1900, inclusive	50, 000. 00
1901 to 1902, inclusive	100, 000. 00
1903 to 1906, inclusive	200, 000. 00
1907	150, 000. 00
1908 to 1910, inclusive	100, 000. 00
1911 to 1917, inclusive	150, 000. 00
1918	175, 000. 00
1919	148, 244. 10
1920	175, 000. 00
1921	180, 000. 00

In the execution of the work many private and State organizations have cooperated, either by furnishing data or by assisting in collecting data. Acknowledgments for cooperation of the first kind are made in connection with the description of each station affected; cooperation of the second kind is acknowledged on page 9.

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Measurements of stream flow have been made at about 5,000 points in the United States and also at many points in Alaska and the Hawaiian Islands. In July, 1920, 1,350 gaging stations were being maintained by the Survey and the cooperating organizations. Many miscellaneous discharge measurements are made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in water-supply papers from time to time.

DEFINITION OF TERMS

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those that represent a rate of flow, as second-feet, gallons per minute, miners' inches, and discharge in second-feet per square mile, and (2) those that represent the actual quantity of water, as run-off in inches, acre-feet, and millions of cubic feet. The principal terms used in this series of reports are second-feet, second-feet per square mile, run-off in inches, and acre-feet. They may be defined as follows:

"Second-feet" is an abbreviation for "cubic feet per second." A second-foot is the rate of discharge of water flowing in a channel of rectangular cross section 1 foot wide and 1 foot deep at an average velocity of 1 foot per second. It is generally used as a fundamental unit from which others are computed.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off in inches" is the depth to which an area would be covered if all the water flowing from it in a given period were uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

An "acre-foot," equivalent to 43,560 cubic feet, is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation.

The following terms not in common use are here defined:

"Stage-discharge relation," an abbreviation for the term "relation of gage height to discharge."

"Control," a term used to designate the section or sections of the stream below the gage which determine the stage-discharge relation at the gage. It should be noted that the control may not be the same section or sections at all stages.

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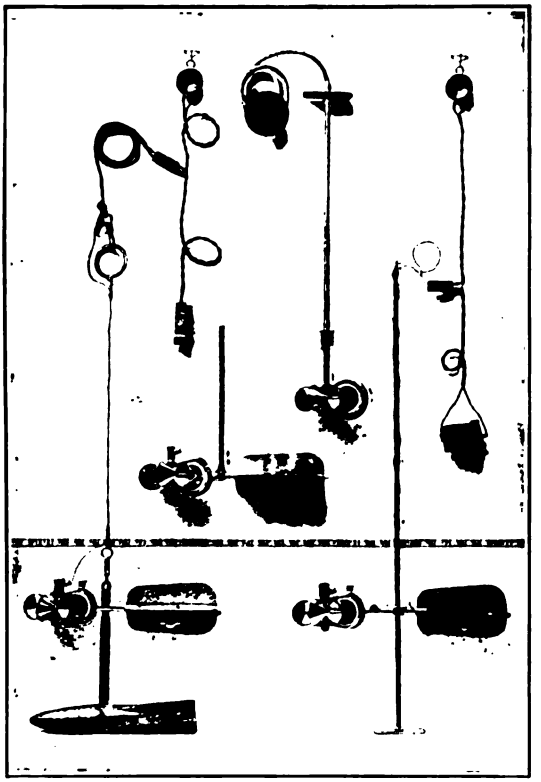

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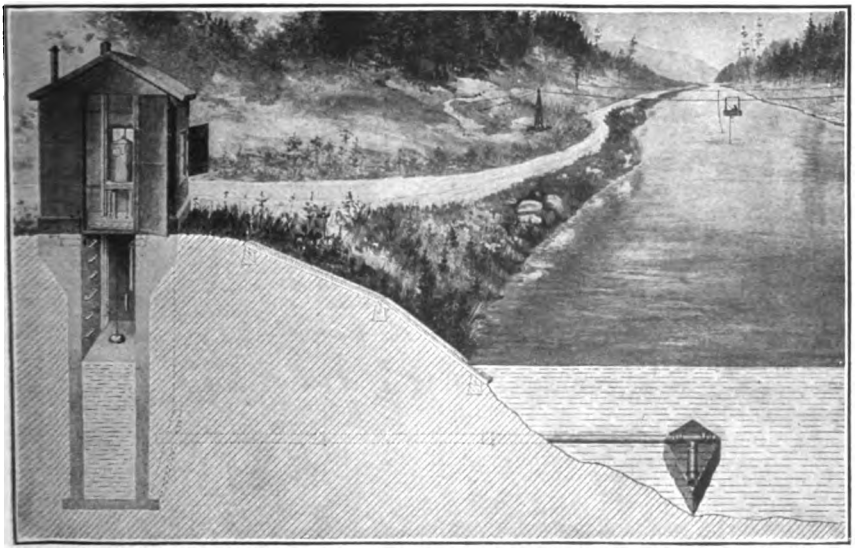

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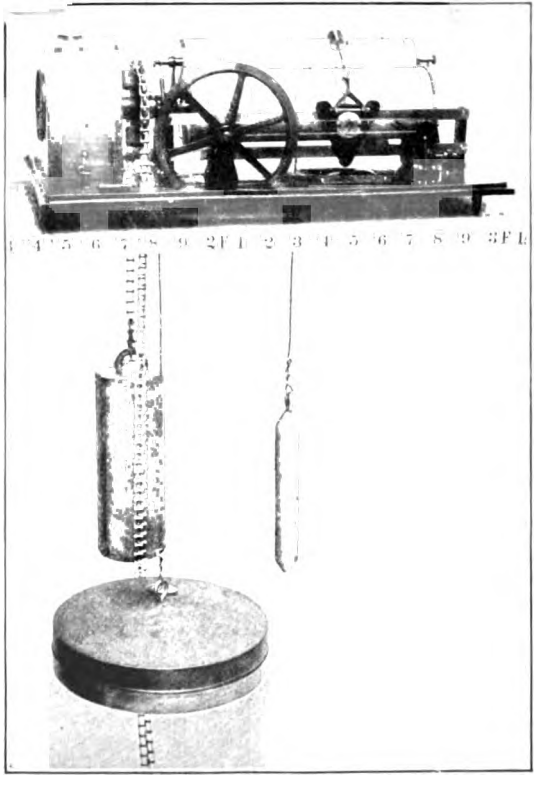

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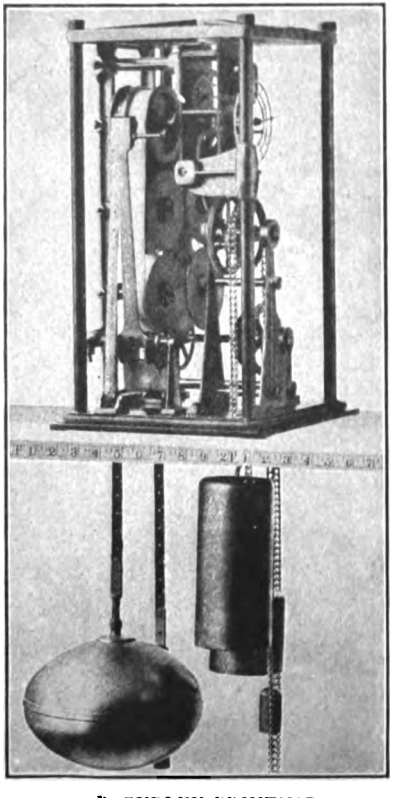
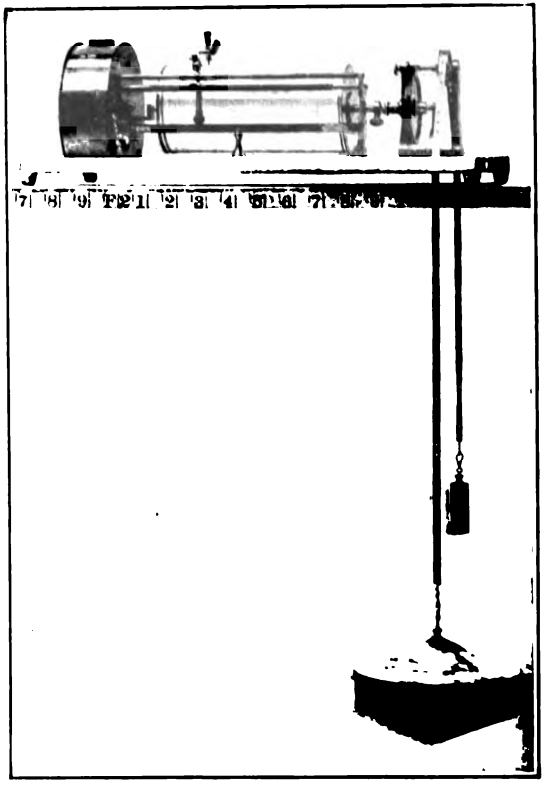


B. GURLEY PRINTING.



C. FRIEZ.

WATER-STAGE RECORDERS.

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The "point of zero flow" for a given gaging station is that point on the gage—the gage height—at which water ceases to flow over the control.

EXPLANATION OF DATA

The data presented in this report cover the two-year period beginning October 1, 1918, and ending September 30, 1920. At the beginning of January in most parts of the United States much of the precipitation in the preceding three months is stored as ground water, in the form of snow or ice, or in ponds, lakes, and swamps, and this stored water passes off in the streams during the spring break-up At the end of September, on the other hand, the only stored water available for run-off is possibly a small quantity in the ground; therefore the run-off for the year beginning October 1 is practically all derived from precipitation within that year.

The base data collected at gaging stations consist of records of stage, measurements of discharge, and general information used to supplement the gage heights and discharge measurements in determining the daily flow. The records of stage are obtained either from direct readings on a staff or chain gage or from a water-stage recorder that gives a continuous record of the fluctuations. Measurements of discharge are made with a current meter. (See Pls. I, II.) The general methods are outlined in standard textbooks on the measurement of river discharge.

From the discharge measurements rating tables are prepared that give the discharge for any stage, and these rating tables, when applied to gage heights, give the discharge from which the daily, monthly, and yearly mean discharge is determined.

The data presented for each gaging station in the area covered by this report comprise a description of the station, a table giving results of discharge measurements, a table showing the daily discharge of the stream, and a table of monthly and yearly discharge and run-off.

If the base data are insufficient to determine the daily discharge, tables giving daily gage heights and results of discharge measurements are published.

The description of the station gives, in addition to statements regarding location and equipment, information in regard to any conditions that may affect the constancy of the stage-discharge relation, covering such subjects as the occurrence of ice, the use of the stream for log driving, shifting of control, and the cause and effect of backwater; it gives also information as to diversions that decrease the flow at the gage, artificial regulation, maximum and minimum recorded stages, and the accuracy of the records.

Many gaging stations on streams in the irrigated sections of the United States are located above most of the diversions from

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streams, and the discharge recorded does not show the water supply available for further development, as prior appropriations below the stations must first be satisfied. To give an idea of the amount of prior appropriations, a paragraph on diversions is presented in each station description. The figures given can not be considered exact but represent the best information available.

The table of daily discharge gives, in general, the discharge in second-feet corresponding to the mean of the gage heights read each day. At stations on streams subject to sudden or rapid diurnal fluctuation the discharge obtained from the rating table and the mean daily gage height may not be the true mean discharge for the day. If such stations are equipped with water-stage recorders the mean daily discharge may be obtained by averaging discharge at regular intervals during the day, or by using the discharge integrator, an instrument operating on the principle of the planimeter and containing as an essential element the rating curve of the station.

In the table of monthly discharge the column headed "Maximum" gives the mean flow for the day when the mean gage height was highest. As the gage height is the mean for the day it does not indicate correctly the stage when the water surface was at crest height, and the corresponding discharge was consequently larger than given in the maximum column. Likewise, in the column headed "Minimum," the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this average flow computations recorded in the remaining columns, which are defined on page 2, are based.

ACCURACY OF FIELD DATA AND COMPUTED RESULTS

The accuracy of stream-flow data depends primarily (1) on the permanence of the stage-discharge relation and (2) on the accuracy of observation of stage, measurements of flow, and interpretation of records.

A paragraph in the description of the station or footnotes added to the tables gives information regarding the (1) permanence of the stage-discharge relation, (2) precision with which the discharge rating curve is defined, (3) refinement of gage readings, (4) frequency of gage readings, and (5) methods of applying daily gage heights to the rating table to obtain the daily discharge.[1]

For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined," within 15 to 25 per cent

[1] For a more detailed discussion of the accuracy of stream-flow data see Grover, N. C., and Hoyt, J. C., Accuracy of stream-flow data: U. S. Geol. Survey Water-Supply Paper 400, pp. 53–59, 1916.

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These notes are very general and are based on the plotting of the individual measurements with reference to the mean-rating curve.

The monthly means for any station may represent with high accuracy the quantity of water flowing past the gage, but the figures showing discharge per square mile and depth of run-off in inches may be subject to gross errors caused by the inclusion of large noncontributing districts in the measured drainage area, by lack of information concerning water diverted for irrigation or other use, or by inability to interpret the effect of artificial regulation of the flow of the river above the station. "Second-feet per square mile" and "Run-off in inches" are therefore not computed if such errors appear probable. The computations are also omitted for stations on streams draining areas in which the annual rainfall is less than 20 inches. All figures representing "second-feet per square mile" and "run-off in inches" published by the Survey in early reports should be used with caution because of possible inherent sources of error not known to the Survey.

The table of monthly discharge gives only a general idea of the flow at the station and should not be used for other than preliminary estimates; the tables of daily discharge allow more detailed studies of the variation in flow. It should be borne in mind, however, that the observations in each succeeding year may be expected to throw new light on data previously published.

PUBLICATIONS

Investigation of water resources by the United States Geological Survey has consisted in large part of measurements of the volume of flow of streams and studies of the conditions affecting that flow, but it has comprised also investigation of such closely allied subjects as irrigation, water storage, water powers, underground waters, and quality of waters. Most of the results of these investigations have been published in the series of water-supply papers, but some have appeared in the bulletins, monographs, professional papers, and annual reports.

The results of stream-flow measurements are now published annually in 12 parts, each part covering an area whose boundaries coincide with natural drainage features as indicated below:

Part I. North Atlantic slope basins.
II. South Atlantic slope and eastern Gulf of Mexico basins.
III. Ohio River basin.
IV. St. Lawrence River basin.
V. Upper Mississippi River and Hudson Bay basins.
VI. Missouri River basin.
VII. Lower Mississippi River basin.
VIII. Western Gulf of Mexico basins.

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IX. Colorado River basin.
X. Great Basin.
XI. Pacific slope basins in California.
XII. North Pacific slope basins, published in three volumes:
A, Pacific slope basins in Washington and upper Columbia River basin.
B, Snake River basin.
C, Lower Columbia River basin and Pacific slope basins in Oregon.

Water-supply papers and other publications of the United States Geological Survey containing data in regard to the water resources of the United States may be obtained or consulted as indicated below:

1. Copies may be obtained free of charge by applying to the Director of the Geological Survey, Washington, D. C. The edition printed for free distribution is, however, small and is soon exhausted.

2. Copies may be purchased at nominal cost from the Superintendent of Documents, Government Printing Office, Washington, D. C., who will on application furnish lists giving prices.

3. Sets of the reports may be consulted in the libraries of the principal cities in the United States.

4. Complete sets are available for consultation in the local offices of the water-resources branch of the Geological Survey, as follows:

Boston, Mass., 2500 Customhouse.
Albany, N. Y., 704 Journal Building.
Trenton, N. J., State House.
Asheville, N. C., 316 Jackson Building.
Chattanooga, Tenn., 37 Municipal Building.
Columbus, Ohio, Brown Hall, Ohio State University.
Chicago, Ill., 1404 Kimball Building.
Madison, Wis., care of Railroad Commission of Wisconsin.
Ames, Iowa, State Highway Commission Building.
Rolla, Mo., Rolla Building, School of Mines and Metallurgy.
Topeka, Kans., 23 Federal Building.
Helena, Mont., 52 National Bank Building.
Denver, Colo., 403 Post Office Building.
Salt Lake City, Utah, 313 Federal Building.
Idaho Falls, Idaho, 228 Federal Building.
Boise, Idaho, 615 Idaho Building.
Tacoma, Wash., 406 Federal Building.
Portland, Oreg., 606 Post Office Building.
San Francisco, Calif., 328 Customhouse.
Los Angeles, Calif., 600 Federal Building.
Tucson, Ariz., 210 Agricultural Building, University of Arizona.
Austin, Tex., State Capitol.
Honolulu, Hawaii, 25 Capitol Building.

A list of the Geological Survey's publications may be obtained by applying to the Director of the United States Geological Survey, Washington, D. C.

Stream-flow records have been obtained at about 5,000 points in the United States, and the data obtained have been published in the reports tabulated on pages 7 and 8.

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Stream-flow data in reports of the United States Geological Survey

[A = Annual Report; B = Bulletin; W = Water-Supply Paper]

Report	Character of data	Year
10th A, pt. 2	Descriptive information only	
11th A, pt. 2	Monthly discharge and descriptive information	1884 to Sept., 1890.
12th A, pt. 2	do	1884 to June 30, 1891.
13th A, pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1886 to Dec. 31, 1893.
B 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A, pt. 2	Descriptive information only	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
W 11	Gage heights (also gage heights for earlier years)	1896.
18th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years)	1895 and 1896.
W 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
W 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
W 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
W 28	Measurements, ratings, and gage heights, Arkansas River, and western United States.	1898.
20th A, pt. 4	Monthly discharge (also for many earlier years)	1898.
W 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A, pt. 4	Monthly discharge	1899.
W 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
W 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
W 75	Monthly discharge	1901.
W 82 to 85	Complete data	1902.
W 97 to 100	do	1903.
W 124 to 135	do	1904.
W 165 to 178	do	1905.
W 201 to 214	do	1906.
W 241 to 252	do	1907–8.
W 261 to 272	do	1909.
W 281 to 292	do	1910.
W 301 to 312	do	1911.
W 321 to 332	do	1912.
W 351 to 362	do	1913.
W 381 to 394	do	1914.
W 401 to 414	do	1915.
W 431 to 444	do	1916.
W 451 to 464	do	1917.
W 471 to 484	do	1918.
W 501 to 514	do	1919–1920.

The records at most of the stations discussed in these reports extend over a series of years, and miscellaneous measurements at many points other than regular gaging stations have been made each year. An index of the reports containing records obtained prior to 1904 has been published in Water-Supply Paper 119.

The following table gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1920. The data for any particular station will in general be found in the reports covering the years during which the station was maintained. For example, data for Machias River at Whitneyville, Me., 1903 to 1920, are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, 301, 321, 351, 381, 401, 431, 451, 471, and 501, which contain records for the New England streams from 1903 to 1920. Results of miscellaneous measurements are published by drainage basins.

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Numbers of water-supply papers containing results of stream measurements, 1899–1920

Year	I North Atlantic slope (St. John River to York River)	II South Atlantic slope and eastern Gulf of Mexico (James River to the Mississippi)	III Ohio River basin	IV St. Lawrence River and Great Lakes basins	V Hudson Bay and upper Mississippi River basins	VI Missouri River basin	VII Lower Mississippi River basin	VIII Western Gulf of Mexico basins	IX Colorado River basin	X Great Basin	XI Pacific slope basins in California	XII North Pacific slope basins: Pacific slope basins in Washington and upper Columbia River	XII North Pacific slope basins: Snake River basin	XII North Pacific slope basins: Lower Columbia River and Pacific slope basins in Oregon
1899 [a]	35	[b] 35, 36	36	36	36	[c] 36, 37	37	37	[d] 37, 38	38, [e] 39	38, [f] 39	38	38	38
1900 [a]	47, [b] 48	48	48, [c] 49	49	49	49, [f] 50	50	50	50	51	51	51	51	51
1901	65, 75	65, 75	65, 75	65, 75	[b] 65, 66, 75	66, 75	[b] 65, 66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75
1902	82	[b] 82, 83	83	[f] 82, 83	[b] 83, 85	84	[b] 83, 84	84	85	85	85	85	85	85
1903	97	[b] 97, 98	98	97	[b] 98, 99, [m] 100	99	[b] 98, 99	99	100	100	100	100	100	100
1904	[n] 124, [o] 125, [p] 126	[p] 126, 127	128	129	[b] 128, 130	130, [q] 131	[b] 128, 131	132	133	133, [r] 134	134	135	135	135
1905	[n] 165, [o] 166, [p] 167	[p] 167, 168	169	170	171	172	[b] 169, 173	174	175, [s] 177	176, [r] 177	177	178	178	[t] 177, 178
1906	[n] 201, [o] 202, [p] 203	[p] 203, 204	205	206	207	208	[b] 205, 209	210	211	212, [r] 213	213	214	214	214
1907–8	241	242	243	244	245	246	247	248	249	250, [r] 251	251	252	252	252
1909	261	262	263	264	265	266	267	268	269	270, [r] 271	271	272	272	272
1910	281	282	283	284	285	286	287	288	289	290	291	292	292	292
1911	301	302	303	304	305	306	307	308	309	310	311	312	312	312
1912	321	322	323	324	325	326	327	328	329	330	331	332A	332B	332C
1913	351	352	353	354	355	356	357	358	359	360	361	362A	362B	362C
1914	381	382	383	384	385	386	387	388	389	390	391	392	393	394
1915	401	402	403	404	405	406	407	408	409	410	411	412	413	414
1916	431	432	433	434	435	436	437	438	439	440	441	442	443	444
1917	451	452	453	454	455	456	457	458	459	460	461	462	463	464
1918	471	472	473	474	475	476	477	478	479	480	481	482	483	484
1919–20	501	502	503	504	505	506	507	508	509	510	511	512	513	514

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39. Estimates for 1899 in Twenty-first Annual Report, Part IV.
[b] James River only.
[c] Gallatin River.
[d] Green and Gunnison rivers and Grand River above junction with Gunnison.
[e] Mohave River only.
[f] Kings and Kern rivers and south Pacific slope basins.
[g] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52. Estimates for 1900 in Twenty-second Report, Part IV.
[h] Wissahickon and Schuylkill rivers to James River.
[i] Scioto River.
[j] Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.
[k] Tributaries of Mississippi from east.
[l] Lake Ontario and tributaries to St. Lawrence River proper.
[m] Hudson Bay only.
[n] New England rivers only.
[o] Hudson River to Delaware River, inclusive.
[p] Susquehanna River to Yadkin River, inclusive.
[q] Platte and Kansas rivers.
[r] Great Basin in California except Truckee and Carson river basins.
[s] Below junction with Gila.
[t] Rogue, Umpqua, and Siletz rivers only.

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COOPERATION

The work in Arizona, Utah, and Wyoming was carried on under cooperative agreement between the United States Geological Survey and the States, and special acknowledgments are due to the cooperating State officials, G. E. P. Smith, irrigation engineer, of the Arizona State Agricultural Experiment Station; G. F. McGonagle, State engineer of Utah; and F. C. Emerson, State engineer of Wyoming.

The State engineer of Colorado, A. J. McCune, cooperated in the maintenance of the stations on Williams Fork near Parshall, Gunnison River near Gunnison, Tomichi Creek at Sargents, Leroux Creek near Lazear, Surface Creek at Cedaredge, Dolores River at Bedrock, and San Miguel River at Naturita.

In Colorado the United States Forest Service furnished the services of a hydrographer for part time during the winter. The water-stage recorders on Blue River at Dillon, on Eagle River at Eagle, and on Uncompahgre River at Ouray and below Ouray were attended to by an employee of the Forest Service.

Financial assistance has been rendered by the United States Office of Indian Affairs in Utah and on North Fork of White River at Whiteriver, Ariz.

Financial assistance has been rendered by the Colorado Power Co. (Colorado River at Glenwood Springs, Colo.), Western Colorado Power Co. (Uncompahgre River at Ouray, Colo.), Redlands Irrigation & Power Co. (Gunnison River near Grand Junction, Colo.), Fruitland Irrigation Co. (Crystal Creek near Maher, Colo.), and Vernal Milling & Light Co.

DIVISION OF WORK

Data for stations in Arizona were collected under the direction of C. E. Ellsworth, district engineer to November 28, 1918, and H. D. McGlashan, district engineer after that date, who were assisted by J. F. Kunesh, C. W. Sopp, and H. D. Empie. The records were compiled and prepared for publication under the direction of H. D. McGlashan and R. C. Rice, district engineers, who were assisted by J. F. Kunesh, William Kessler, and J. H. Gardiner.

Data for stations in Wyoming and Colorado were collected and prepared for publication under the direction of Robert Follansbee, district engineer, assisted by P. V. Hodges, J. B. Spiegel, T. J. Watkins, H. E. Grosbach, and Miss Esther M. Dye.

Data for stations in Utah were collected and prepared for publication under the direction of A. B. Purton, district engineer, assisted by W. E. Dickinson, L. W. Jordan, J. J. Sanford, J. W. Bones, R. R. Rowe, B. F. Rush, and E. C. Howard.

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GAGING-STATION RECORDS

COLORADO RIVER BASIN

COLORADO RIVER AND TRIBUTARIES ABOVE GREEN RIVER [2]

COLORADO RIVER AT HOT SULPHUR SPRINGS, COLO.

LOCATION.—In sec. 2, T. 1 N., R. 78 W., at highway bridge near Denver & Salt Lake Railroad station at Hot Sulphur Springs, Grand County.

DRAINAGE AREA.—785 square miles (revised; measured on Colorado base map, scale 1: 500,000).

RECORDS AVAILABLE.—July 22, 1904, to September 30, 1909; September 23, 1910, to September 30, 1920.

GAGE.—Chain gage on downstream side of bridge; read by G. C. Henry. Prior to April 16, 1906, a staff gage 1,000 feet downstream, set to datum 6.07 feet lower, was used.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of well-compacted gravel. Control 150 feet downstream; shifting at long intervals. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 5.45 feet at 9 a. m. May 29 (discharge, 3,620 second-feet); minimum discharge occurred during winter.

Maximum stage recorded during year ending September 30, 1920, 7.25 feet at 5 p. m. June 9 (discharge, 6,750 second-feet); minimum discharge occurred during winter.

1904–1909; 1910–1920: Maximum stage recorded, 8.5 feet at noon June 14, 1918 (discharge, 8,770 second-feet); minimum discharge occurs during winters (estimated at 63 second-feet on February 15, 25, and 27, 1908).

ICE.—Stage-discharge relation seriously affected by ice.

DIVERSIONS.—Court decrees for diversion of 800 second-feet from Colorado River and North Fork above station, of which 525 second-feet is for diversion across the divide into headwaters of Cache la Poudre River. Under this decree 10,100 acre-feet was diverted during 1919, and 15,200 acre-feet during 1920.

REGULATION.—Diurnal fluctuation during spring of year from alternate melting and freezing of mountain snow. No artificial regulation.

ACCURACY.—Stage-discharge relation slightly shifting; seriously affected by ice. Standard rating curve well defined; applied indirectly owing to shifting control October 1–31, 1918, and June 21 to August 5, 1920. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for periods of ice effect for which discharge was ascertained as noted in footnote to table of daily discharge, and except for periods for which shifting-control method was used. Records excellent except for periods of shifting control, for which they are good, and periods of ice effect, for which they are fair.

Discharge measurements of Colorado River at Hot Sulphur Springs, Colo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1918		*Feet*	*Sec.-ft.*	1920		*Feet*	*Sec.-ft.*
Oct. 12	P. V. Hodges	2.86	378	Jan. 1	T. J. Watkins	[a] 2.71	88
1919				Feb. 29	P. V. Hodges	[a] 2.90	106
Jan. 18	do	[a] 3.04	106	July 17	do	3.71	1,250
Feb. 11	T. J. Watkins	[a] 3.46	102				
July 9	J. B. Spiegel	2.84	625				
Oct. 15	P. V. Hodges	1.89	205				

[a] Stage-discharge relation affected by ice.

[2] By act of Congress the name of Grand River was changed to Colorado River, July 25, 1921.

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Daily discharge, in second-feet, of Colorado River at Hot Sulphur Springs, Colo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Apr.	May	June	July	Aug.	Sept.
1918-19											
1	337	258				372	820	2,390	940	580	181
2	337	240				440	900	1,770	900	610	195
3	357	240				440	780	1,440	900	940	190
4	337	240				339	820	1,340	900	780	188
5	378	310				350	780	1,150	860	580	192
6	424	275				275	1,020	1,060	820	520	198
7	424	240				210	1,060	1,060	820	395	188
8	424	237				158	980	1,150	740	395	192
9	378	234				173	980	1,340	670	395	192
10	424	234				175	980	1,440	580	350	231
11	424	234			102	190	900	1,890	520	330	240
12	378	234				200	860	1,890	490	275	275
13	357	234				275	900	1,890	550	258	292
14	357	231				310	980	1,890	580	246	350
15	317	231				213	1,200	1,890	465	234	350
16	298	231				195	1,290	2,010	465	222	330
17	298	225				169	1,550	1,890	465	213	231
18	298	216		106		292	1,890	1,890	418	219	240
19	280	198				395	2,130	1,890	490	225	213
20	263	181				490	2,390	1,890	372	213	298
21	280	156				550	2,810	1,550	350	213	205
22	298	144				740	2,950	1,440	350	208	181
23	317	130				740	3,100	1,440	350	222	181
24	298	118				1,060	3,250	1,340	330	198	188
25	280	118				1,240	3,100	1,150	292	195	183
26	263	120				1,240	3,250	1,150	292	205	183
27	263	125				1,200	3,100	1,060	310	200	183
28	298	130				1,020	3,250	1,100	372	198	183
29	263	132				860	3,400	1,020	372	177	183
30	298	138				860	3,250	1,020	418	167	183
31	240						2,950		580	169	
1919-20											
1	173	160	84	88	110	440	254	5,580	3,550	780	418
2	173	165	85	88	106	418	670	4,860	3,400	780	395
3	177	175	85	87	104	395	1,060	4,520	3,250	860	372
4	181	202	88	86	103	395	1,060	4,180	3,100	860	372
5	181	154	88	85	102	413	1,440	4,520	2,950	860	350
6	179	151	85	84	101	440	1,440	4,520	2,260	705	350
7	181	144	83	83	100	740	2,010	4,690	2,010	705	418
8	181	140	82	83	100	980	2,010	5,400	1,890	520	440
9	181	132	81	85	101	1,240	2,130	6,660	1,660	580	465
10	181	122	82	87	101	1,240	1,890	5,940	1,550	580	418
11	181	115	85	89	101	1,290	1,770	5,580	1,550	640	395
12	181	110	88	91	102	1,240	1,890	5,220	1,340	580	372
13	181	110	92	93	101	1,100	1,890	4,520	1,440	490	330
14	181	110	92	95	102	1,100	2,010	3,860	1,240	490	310
15	205	110	92	98	104	1,200	2,130	3,700	1,200	640	300
16	202	112	92	102	110	1,100	2,260	5,040	1,100	550	291
17	195	116	92	104	115	1,100	2,530	4,520	1,240	465	282
18	173	120	92	107	120	520	2,810	4,180	1,150	465	273
19	165	125	92	110	122	490	3,100	3,700	1,150	550	264
20	163	126	93	106	120	465	3,860	3,250	980	820	282
21	161	126	95	102	110	465	4,180	3,320	860	940	286
22	160	130	95	99	104	440	4,350	3,620	900	820	350
23	167	132	95	98	99	418	4,520	3,620	900	740	350
24	163	132	95	98	98	350	4,350	3,620	1,240	640	350
25	179	110	95	104	98	310	4,690	3,780	1,440	490	398
26	190	95	96	107	99	258	5,400	3,780	1,150	418	350
27	185	88	102	108	102	225	4,690	3,780	980	520	330
28	175	83	107	110	105	258	4,350	3,780	820	490	310
29	158	83	114	114	106	292	5,400	3,780	780	490	310
30	158	83	110	114		258	5,400	3,620	740	465	310
31	158		98	112			5,580		670	440	

NOTE.—Stage-discharge relation affected by ice Nov. 8, 1918, to Apr. 2, 1919, and Oct. 28, 1919, to Apr. 5, 1920. Discharge, Nov. 8-30, 1918, Apr. 1, 2, 1919, Oct. 28, 1919, to Feb. 29, 1920, and Apr. 1-5, 1920, ascertained by means of discharge measurements, gage-height and temperature records, and observer's notes. Mean discharge by means of discharge measurements, gage-height and temperature records, and observer's notes, as follows: December, 1918, 122 second-feet; January, 1919, 106 second-feet; February, 1919, 101 second-feet; March, 1919, 125 second-feet; and March, 1920, 342 second-feet. Gage not read Aug. 14-17, 1919, and Sept. 15-18, 1920; discharge interpolated.

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Monthly discharge of Colorado River at Hot Sulphur Springs, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	424	240	329	20,200
November	310	118	201	12,000
December			122	7,500
January			106	6,520
February			101	5,610
March			125	7,690
April	1,240	158	505	30,000
May	3,400	780	1,860	114,000
June	2,390	1,020	1,510	89,800
July	940	292	547	33,600
August	940	167	327	20,100
September	350	181	217	12,900
The year	3,400		498	360,000
1919–20				
October	205	158	176	10,800
November	202	83	125	7,440
December	114	81	92.1	5,660
January	114	83	97.3	5,980
February	122	98	105	6,040
March			342	21,000
April	1,290	225	653	38,900
May	5,580	254	2,940	181,000
June	6,660	3,250	4,370	260,000
July	3,550	670	1,560	95,900
August	940	418	625	38,400
September	465	264	348	20,700
The year	6,660	81	953	692,000

NOTE.—See footnote to table of daily discharge.

COLORADO RIVER AT GLENWOOD SPRINGS, COLO.

LOCATION.—In sec. 9, T. 6 S., R. 89 W., at Glenwood Springs, Garfield County. No Name Creek enters Colorado River 2 miles above station and Roaring Fork half a mile below.

DRAINAGE AREA.—4,560 square miles (revised; measured on base map of Colorado).

RECORDS AVAILABLE.—January 1, 1900, to September 30, 1920; also May 12 to July 17, 1899, at point just above Roaring Fork.

GAGE.—Fries water-stage recorder on right bank in front of power house; installed May 17, 1910; inspected by employee of United States Forest Service. See Water-Supply Paper 175 for description of early gages and gage used in 1905, which was also used until May 17, 1910. No change in gage datum.

DISCHARGE MEASUREMENTS.—Made from cable beneath State Street Bridge, a third of a mile below gage.

CHANNEL AND CONTROL.—Bed composed of well-compacted gravel, on which silt is deposited. Control at riffle 300 feet downstream; slightly shifting. Banks not subject to overflow except at extremely high stages.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 8.4 feet at noon May 29 and 30 (discharge, 12,300 second-feet); minimum stage, 1.8 feet at 6 p. m., March 9 (discharge, 135 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 11.2 feet at noon June 1 (discharge, 24,300 second-feet); minimum stage, 1.78 feet at 2 p. m. March 28 (discharge, 110 second-feet).

1900–1920: Maximum stage recorded, 12.55 feet at noon June 14 and 15, 1918 (discharge, 30,100 second-feet); minimum discharge recorded in 1920.

ICE.—Stage-discharge relation not affected by ice. Hot water from springs keeps river open.

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DIVERSIONS.—Court decrees for diversion of 48 second-feet of water from Colorado River for irrigation between this station and Hot Sulphur Springs and 1,250 second-feet for power. Water diverted for power is returned to river above Glenwood Springs.

REGULATION.—Shoshone power plant of Colorado Power Co., 7 miles upstream, controls flow during day at low water, but has insufficient pondage to control it for more than a few hours.

ACCURACY.—Stage-discharge relation for low stages changed slightly during high water of May and June, 1920. Rating curves used prior and subsequent to change well defined. Operation of water-stage recorder fairly satisfactory (see footnote to daily-discharge table). Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging bi-hourly discharge, except for periods during which recorder did not operate for which it was ascertained as indicated in footnote to daily-discharge table. Records excellent except for periods of missing gage-height record, for which they are fair.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Colorado River at Glenwood Springs, Colo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1918		*Feet*	*Sec.-ft.*	1919		*Feet*	*Sec.-ft.*
Nov. 23	Robert Follansbee	3.80	1,110	Oct. 24	T. J. Watkins	3.71	1,230
Dec. 30	T. J. Watkins	3.30	744	Nov. 20	Robert Follansbee	3.80	1,150

Daily discharge, in second-feet, of Colorado River at Glenwood Springs, Colo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918-19												
1	1,680	1,320	880	730	758	642	2,450	4,030	9,060	3,400	2,170	904
2	1,500	1,290	888	688	758	660	2,520	4,140	7,420	3,300	2,310	987
3	1,620	1,330	896	624	745	648	2,310	4,140	6,200	3,710	2,760	1,000
4	1,620	1,330	1,070	786	745	654	2,050	3,920	5,500	4,140	2,930	880
5	1,560	1,380	904	786	735	630	2,050	3,920	4,980	3,600	2,600	1,030
6	1,560	1,440	936	779	808	654	2,180	4,490	4,490	3,200	2,180	1,000
7	1,620	1,500	1,120	786	730	654	2,050	4,850	4,260	3,110	1,920	928
8	1,560	1,240	1,080	786	702	772	1,560	4,610	4,260	3,200	1,740	1,040
9	1,560	1,220	1,100	730	695	671	1,300	4,490	4,610	2,840	1,800	1,030
10	1,560	1,170	1,060	705	667	730	1,180	4,370	4,980	2,520	1,680	1,000
11	1,620	1,140	960	800	744	744	1,150	4,370	5,500	2,310	1,620	1,060
12	1,680	1,130	808	751	695	751	1,140	4,260	5,770	2,240	1,560	1,140
13	1,620	1,140	824	824	751	744	1,110	4,260	5,910	2,180	1,500	1,090
14	1,500	1,130	764	793	714	758	1,220	4,610	5,910	2,380	1,380	1,260
15	1,440	1,150	772	714	730	920	1,440	5,230	6,200	2,380	1,330	1,640
16	1,380	1,240	751	686	785	715	1,440	6,200	6,500	2,240	1,240	1,840
17	1,330	1,300	880	800	618	702	1,310	6,500	6,500	2,050	1,120	1,620
18	1,330	1,150	904	718	628	760	1,440	7,420	6,200	1,980	1,200	1,490
19	1,330	1,100	896	824	758	985	1,800	8,060	6,200	1,900	1,070	1,360
20	1 330	1,050	802	800	674	1,170	2,450	9,400	5,770	1,900	1,020	1,220
21	1,310	1,100	869	888	674	1,160	2,930	10,800	5,630	1,860	1,030	1,220
22	1,380	1,100	785	808	758	1,330	3,300	11,200	5,230	1,680	1,070	1,170
23	1,330	1,130	786	765	738	1,740	4,030	11,600	4,980	1,560	978	1,140
24	1,380	920	793	800	772	1,800	4,850	11,600	4,730	1,440	978	1,140
25	1,380	987	554	848	636	1,560	5,360	11,200	4,610	1,380	969	1,120
26	1,330	944	607	784	811	1,260	5,500	11,600	4,370	1,360	1,020	1,140
27	1,310	751	574	730	674	1,270	5,360	11,600	4,140	1,500	1,020	1,110
28	1,270	896	709	791	730	1,330	5,100	11,600	3,920	1,630	1,000	969
29	1,240	896	669	723	-------	1,620	4,370	12,300	3,710	1,760	1,000	
30	1,330	824	775	728	-------	1,800	4,030	12,300	3,600	1,900	1,090	
31	1,230	-------	808	716	-------	2,180	-------	10,800	-------	2,040	928	

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Daily discharge, in second-feet, of Colorado River at Glenwood Springs, Colo., for the years ending Sept. 30, 1919 and 1920—Continued.

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919–20												
1	996	880	969	674	716	779	772	1,860	23,800	10,800	3,300	1,680
2	1,000	1,120	1,090	808	709	723	772	2,450	22,500	10,100	3,400	1,560
3	952	1,100	1,030	716	730	695	606	3,500	20,400	9,750	3,400	1,560
4	969	1,120	960	772	674	723	744	4,140	18,700	9,400	3,600	1,740
5	936	1,120	888	856	660	695	723	5,630	18,200	9,080	3,710	1,680
6	1,040	1,230	978	832	681	744	894	6,060	18,700	8,390	3,710	1,680
7	1,060	1,230	1,030	718	702	515	800	6,800	20,000	7,420	3,400	1,740
8	1,030	1,240	969	600	737	642	944	7,420	21,700	6,500	3,110	1,800
9	1,030	1,040	920	654	648	786	920	7,420	22,500	5,910	2,840	1,920
10	1,080	980	904	660	688	660	1,420	9,400	22,500	5,630	2,600	1,920
11	1,040	900	912	660	667	688	1,610	9,400	21,200	5,520	2,760	1,880
12	1,020	990	969	600	654	800	1,500	8,720	19,500	5,400	2,760	1,800
13	1,120	1,030	900	730	667	808	1,440	8,060	19,100	5,290	2,600	1,680
14	1,060	990	850	730	792	540	1,550	8,720	18,700	5,180	2,600	1,620
15	1,060	940	830	880	648	864	1,880	8,720	18,700	5,070	2,290	1,500
16	1,070	760	630	800	702	737	2,170	8,060	18,200	4,960	2,100	1,500
17	1,110	1,080	715	840	751	758	2,130	8,060	17,000	4,850	2,000	1,500
18	1,120	1,080	710	618	585	786	1,700	9,400	15,700	4,730	1,920	1,440
19	1,050	1,130	700	772	674	758	1,400	11,600	13,900	4,730	1,830	1,440
20	1,100	996	779	730	695	808	1,250	13,900	12,300	4,370	1,700	1,500
21	1,080	1,010	695	695	832	709	1,260	16,500	11,600	4,030	2,000	1,500
22	1,030	1,020	779	730	702	928	1,310	18,200	11,600	3,920	2,200	1,500
23	1,060	1,140	751	730	744	944	1,210	18,200	11,600	3,920	2,500	1,500
24	1,000	1,210	765	709	744	896	1,210	18,200	11,900	4,140	2,650	1,500
25	1,020	1,210	612	695	612	800	1,230	19,100	12,300	4,610	2,300	1,620
26	978	1,220	848	751	758	896	1,320	21,200	11,900	5,500	1,900	1,620
27	1,050	960	896	730	590	928	1,180	20,800	11,200	5,910	1,850	1,620
28	1,100	660	709	737	779	723	1,180	19,500	10,800	4,850	1,800	1,620
29	1,080	510	786	660	575	808	1,270	20,000	11,200	4,140	1,800	1,560
30	936	535	737	654	.....	772	1,440	21,700	11,200	3,920	1,800	1,560
31	969	.....	730	744	.....	765	.....	23,000	.....	3,500	1,680	.....

NOTE.—Recorder not operating July 27 to Aug. 1, Aug. 11, 12, and Sept. 18, 19, 1919; discharge interpolated. Recorder not operating Nov. 2–18 and Dec. 9–19, 1919, and Jan. 11–17, 1920; discharge determined from power output at Shoshone plant. Recorder not operating May 3–5, July 11–16, and Aug. 16–28, 1920; discharge ascertained by comparison with flow of Roaring Fork. Daily discharge ascertained by averaging bi-hourly discharge Oct. 21, Nov. 17, Dec. 14, 20–22, 25–27, 30, 1918; Jan. 10, 15, 16, 18, 26, 28, Feb. 3–5, 13, 14, 16, 18, 23, 26, Mar. 9, 16, 18, 19, Nov. 30, Dec. 2, 28–31, 1919; Jan. 1–7, 18, 20, 21, 24, Feb. 2, 3, 6, 14–17, 19–21, 23, 24, 26, 28, 29, Mar. 1–6, 13, 17, 18, 20–22, 28, Apr. 3, 4, 6, 8, 1920.

Monthly discharge of Colorado River at Glenwood Springs, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	1,680	1,240	1,450	89,200
November	1,500	751	1,140	67,800
December	1,120	554	846	52,000
January	888	624	764	47,000
February	811	618	723	40,200
March	2,180	630	1,030	63,300
April	5,500	1,110	2,630	156,000
May	12,300	3,920	7,420	456,000
June	9,060	3,600	5,370	320,000
July	4,140	1,360	2,340	144,000
August	2,930	928	1,490	91,600
September	1,840	880	1,150	68,400
The year	12,300	554	2,200	1,600,000
1919–20				
October	1,120	996	1,030	63,300
November	1,240	510	1,010	60,100
December	1,090	612	840	51,600
January	880	600	725	44,600
February	832	575	691	39,700
March	944	515	764	47,000
April	2,170	606	1,260	75,000
May	26,000	1,869	11,800	726,000
June	23,800	10,800	16,600	988,000
July	10,800	3,500	5,850	360,000
August	3,710	1,680	2,520	155,000
September	1,920	1,440	1,620	96,400
The year	23,800	510	3,730	2,710,000

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COLORADO RIVER NEAR PALISADE, COLO.

LOCATION.—In sec. 2, T. 11 S., R. 98 W., at State bridge 2 miles above Palisade, Mesa County. Nearest important tributary, Plateau Creek, enters 6 miles above.

DRAINAGE AREA.—8,790 square miles (revised; measured on base map of Colorado, scale 1:500,000).

RECORDS AVAILABLE.—April 9, 1902, to September 30, 1920.

GAGE.—Chain gage on downstream side of bridge near midspan; read to tenths twice daily, by A. Barnhisel.

DISCHARGE MEASUREMENTS.—Made from bridge 2 miles below gage.

CHANNEL AND CONTROL.—Bed composed of gravel, silt, and scattered boulders. Control at rapids 300 feet downstream; practically permanent. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—No data.

ICE.—Stage-discharge relation affected by ice. Data insufficient to warrant daily-discharge determinations.

DIVERSIONS.—Court decrees for diversion of 1,828 second-feet from Colorado River between this station and Glenwood Springs, of which 628 second-feet is for irrigation and 1,200 second-feet for power for pumping. Two irrigation districts using water for power abandoned their pumping plants in 1919, and now obtain water from the high line canal of United States Bureau of Reclamation. This canal has been in operation since 1916, and will eventually divert 1,425 second-feet from a point 6 miles above station. Since 1910, Orchard Mesa Irrigation District has diverted a maximum of about 350 second-feet from a point 7 miles above station.

REGULATION.—None.

COOPERATION.—Complete records furnished by United States Bureau of Reclamation.

Discharge measurements of Colorado River near Palisade, Colo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft.*	1920		*Feet*	*Sec.-ft.*
Aug. 20	Thomas and Robbins	11.9	691	June 18	Hoag and Nichols	20.1	24,500
Sept. 23	Page and Blackmer	12.65	1,590	Aug. 3	do	14.7	5,560
				Sept. 3	C. S Hoag	13.1	2,410

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Daily discharge, in second-feet, of Colorado River near Palisade, Colo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19											
1	2,390	2,390	1,640	-------	1,500	3,880	7,300	16,600	6,210	2,940	1,670
2	2,320	2,399	1,640	-------	1,500	4,180	7,740	12,900	6,080	3,480	1,680
3	2,250	2,390	1,640	-------	1,500	4,180	8,330	11,000	5,960	4,600	1,230
4	2,250	2,390	1,620	-------	1,640	3,780	8,180	9,740	6,600	4,810	1,190
5	2,250	2,390	1,620	-------	1,530	3,480	8,180	8,480	6,210	4,390	910
6	2,250	2,390	1,620	-------	1,480	4,280	8,640	7,590	4,920	3,680	1,190
7	2,120	2,390	1,620	-------	1,530	3,680	9,420	7,300	5,030	2,940	1,110
8	2,120	2,460	1,600	-------	1,530	3,080	9,260	7,300	5,250	2,540	990
9	2,120	2,060	1,600	-------	1,580	2,620	9,100	8,180	4,920	2,320	1,320
10	2,250	2,000	1,600	-------	1,420	2,180	8,790	8,640	4,280	2,260	1,190
11	2,250	2,000	1,600	-------	1,480	2,120	8,480	9,900	3,880	2,320	1,030
12	2,390	2,000	1,600	-------	1,420	2,120	7,880	10,700	3,480	2,180	1,320
13	2,390	2,000	1,580	-------	1,640	2,120	7,590	10,900	3,390	2,060	1,530
14	2,260	2,000	1,580	-------	2,060	2,180	8,640	11,200	3,390	1,820	1,640
15	2,250	2,060	-------	-------	1,700	2,250	8,330	11,000	3,580	1,640	2,008
16	2,250	2,250	-------	-------	1,640	2,320	11,000	11,700	3,390	1,530	2,540
17	2,120	2,250	-------	-------	1,640	2,180	12,400	11,700	3,120	1,370	2,620
18	2,120	1,580	-------	-------	1,760	2,390	13,200	11,700	3,300	1,260	2,390
19	2,120	2,120	-------	-------	2,180	2,860	14,800	11,400	2,940	1,420	2,180
20	2,120	2,060	-------	-------	2,540	4,080	15,600	10,900	2,780	1,190	2,000
21	2,120	2,000	-------	-------	2,940	5,030	18,400	10,400	2,700	1,190	1,760
22	2,180	2,000	-------	-------	3,120	6,210	19,900	9,740	2,540	1,190	1,700
23	2,120	2,000	-------	-------	3,580	7,590	19,700	9,260	2,180	1,070	1,700
24	2,120	2,000	-------	-------	3,210	9,260	19,700	8,640	2,060	1,030	1,640
25	2,250	1,700	-------	-------	2,860	9,900	19,900	8,330	1,940	1,070	1,640
26	2,320	2,060	-------	-------	2,460	10,200	20,500	7,880	1,840	1,110	1,530
27	2,180	1,820	-------	-------	2,250	10,400	20,800	7,300	2,000	990	1,480
28	2,120	1,530	-------	-------	2,320	9,740	21,000	7,160	2,000	1,110	1,370
29	2,180	1,580	-------	-------	2,320	8,330	21,200	6,600	2,000	1,070	1,190
30	2,120	1,640	-------	-------	2,860	7,440	21,400	6,340	2,860	1,030	1,420
31	2,250	-------	-------	-------	3,210	-------	19,900	-------	3,030	910	-------
1919–20											
1	1,280	1,640	-------	-------	1,370	1,880	3,390	41,600	19,200	5,480	2,460
2	1,320	1,700	-------	-------	2,250	1,480	5,140	39,500	18,800	5,360	2,390
3	1,280	1,580	-------	-------	2,250	1,580	6,740	35,200	18,200	5,480	2,250
4	1,190	1,760	-------	-------	1,640	1,480	7,880	31,900	17,600	6,880	2,120
5	1,280	1,820	-------	-------	1,530	1,480	8,790	30,100	17,400	6,340	2,120
6	1,230	1,700	-------	-------	1,530	1,580	10,200	30,700	16,400	5,960	2,180
7	1,280	1,700	-------	-------	1,420	1,700	11,200	32,800	15,000	5,960	2,180
8	1,320	1,880	-------	-------	1,230	1,940	12,400	35,500	13,100	5,250	2,180
9	1,320	1,760	-------	-------	1,280	2,060	13,800	38,600	12,000	4,600	2,320
10	1,370	1,700	-------	-------	1,530	2,390	15,600	38,200	11,200	4,180	2,540
11	1,370	1,640	-------	-------	1,640	2,940	16,800	35,500	10,400	4,080	2,540
12	1,370	1,640	-------	-------	1,480	2,860	15,800	32,500	10,400	4,080	2,540
13	1,370	1,640	-------	-------	1,530	2,540	14,300	31,900	9,900	4,080	2,390
14	1,420	1,640	-------	-------	1,820	2,700	16,800	30,700	9,420	3,980	2,250
15	1,580	1,530	-------	-------	1,420	3,030	16,000	30,100	8,640	3,680	2,120
16	1,530	1,530	-------	-------	1,530	4,600	15,200	29,600	8,480	3,390	2,120
17	1,420	1,480	-------	-------	1,420	4,600	15,000	27,600	8,480	3,120	2,000
18	1,420	1,640	-------	-------	1,580	3,390	16,800	25,300	8,790	2,940	2,000
19	1,480	1,700	-------	-------	1,480	2,860	21,200	23,000	8,180	2,700	2,000
20	1,370	1,640	-------	-------	1,530	2,460	26,300	21,200	7,880	2,780	2,000
21	1,370	1,640	-------	-------	1,580	2,250	29,900	19,900	7,440	3,030	2,060
22	1,580	1,640	-------	-------	1,370	2,250	34,900	20,300	6,880	3,580	2,120
23	1,320	1,640	-------	-------	1,880	2,120	35,800	20,800	6,600	3,880	2,120
24	1,320	1,580	-------	-------	1,820	2,120	34,000	21,200	7,440	3,980	2,120
25	1,580	1,580	-------	-------	1,700	2,000	35,800	21,400	7,590	3,390	3,120
26	1,420	1,700	-------	-------	1,700	2,320	39,800	21,400	8,790	2,860	2,250
27	1,370	1,600	-------	1,640	1,820	2,120	39,200	20,100	9,740	2,860	2,390
28	1,480	1,600	-------	1,480	1,760	2,120	36,400	19,700	8,480	2,860	2,390
29	1,420	1,600	-------	1,640	1,530	2,120	36,100	19,900	7,160	2,860	2,390
30	1,420	1,600	-------	-------	1,580	2,460	38,200	19,700	6,470	2,860	2,390
31	1,420	-------	-------	-------	1,530	-------	40,200	-------	5,960	2,780	-------

NOTE.—Quantities changed slightly to conform to rules of computation used by U. S. Geol. Survey. Discharge estimated because of ice, as follows: Dec. 3–12, 1918, as shown in table; mean discharge for December, 1918, 1,600 second-feet; January and February, 1919, discharge not determined; Mar. 1–3, 1919, as shown in table; December, 1919, and January and February, 1920, 1,600 second-feet.

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Monthly discharge of Colorado River near Palisade, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	2,390	2,120	2,210	136,000
November	2,460	1,530	2,060	123,000
December			1,600	98,400
March	3,580	1,420	2,080	128,000
April	10,400	2,120	4,800	286,000
May	21,400	7,300	13,400	824,000
June	16,600	6,340	9,680	576,000
July	6,600	1,840	3,670	226,000
August	4,810	910	2,020	124,000
September	2,620	910	1,530	91,000
1919–20				
October	1,580	1,190	1,380	84,800
November	1,880	1,480	1,650	98,200
December			1,600	98,400
January			1,600	98,400
February			1,600	92,000
March	2,250	1,230	1,600	98,400
April	4,600	1,480	2,380	142,000
May	40,200	3,290	21,600	1,330,000
June	41,600	19,700	28,200	1,680,000
July	19,200	5,960	10,700	658,000
August	6,880	2,700	4,040	248,000
September	3,120	2,000	2,270	135,000
The year	41,600		6,560	4,760,000

NOTE.—See footnote to daily-discharge table.

COLORADO RIVER NEAR FRUITA, COLO.

LOCATION.—In sec. 20, T. 1 N., R. 2 W. New Mexico principal meridian, at highway bridge 1½ miles south of Fruita, Mesa County. Nearest important tributary, Little Salt Wash, enters 1 mile below station; Gunnison River enters at Grand Junction, 12 miles above.

DRAINAGE AREA.—16,800 square miles (measured on map in Hayden's atlas).

RECORDS AVAILABLE.—Flood records during 1908, 1909, and 1910; continuous records April 1, 1911, to September 30, 1920.

GAGE.—Chain on downstream side of left span; read by L. C. Jones. Prior to May 3, 1911, gage was vertical staff attached to center pier, datum 0.05 foot lower.

DISCHARGE MEASUREMENTS.—Made from three-span highway bridge.

CHANNEL AND CONTROL.—Bed composed of silt and gravel which shifts during high water, scouring out at high stages and filling in afterwards. Control is riffle 600 feet downstream; somewhat shifting. Banks subject to overflow at stage of 14 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 10.2 feet at 8 a. m. May 29 (discharge, 32,200, second-feet); minimum stage, 1.9 feet August 25–31 (discharge, 1,270 second-feet).

Maximum stage recorded during year ending September 30, 1920, 15.0 feet at 8 a. m. May 23 (discharge, 79,100 second-feet); minimum stage occurred during winter.

1908–1920: Maximum stage recorded that of May 23, 1920. Weather Bureau states that highest stage known was about 18.5 feet on July 4, 1884 (discharge estimated from extension of rating curve and levels across overflow, 125,000 second-feet); minimum stage that of August, 1919.

ICE.—Stage-discharge relation seriously affected by ice.

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Diversions.—Court decrees for diversions of 788 second-feet from Colorado River, between the Palisade station and Fruita.

Regulation.—None.

Accuracy.—Stage-discharge relation shifted March 1, 1919, and August 6, 1920; affected by ice during winter. Rating curves used from October 1, 1918, to February 28, 1919, March 1, 1919, to August 6, 1920, and August 21 to September 30, 1920, well defined, up to 25,000 second-feet. Indirect method used for shifting control August 7 to 20, 1920. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good, except for high water and periods affected by ice, for which they are fair.

Cooperation.—Gage-height record furnished by United States Weather Bureau.

Discharge measurements of Colorado River near Fruita, Colo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft.*
May 3	Robert Follansbee	7.40	14,100
Oct. 21	Hodges and Watkins	2.97	2,520
1920			
May 7	Robert Follansbee	8.94	22,300

Daily discharge, in second-feet, of Colorado River near Fruita, Colo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	3,540	3,720	3,370			2,320	6,500	12,800	27,200	8,380	5,330	1,350
2	3,370	3,540	3,370			2,480	6,500	13,200	22,100	8,090	5,550	1,730
3	3,370	3,540	3,370			2,700	6,750	14,400	18,200	6,500	7,000	2,550
4	3,370	3,540	3,370			3,020	6,500	14,800	14,400	6,750	7,260	1,730
5	3,370	3,540	3,370			3,020	6,020	15,200	14,000	7,810	6,500	1,430
6	3,200	3,540	3,370			2,700	6,500	15,700	12,800	8,380	5,780	1,350
7	3,040	3,720	3,370			2,550	7,000	16,100	10,900	8,380	5,110	1,430
8	2,880	3,720	3,370			2,400	6,020	15,200	11,300	8,090	4,300	1,630
9	3,370	3,540	3,370			2,550	4,900	14,800	12,000	6,750	3,720	2,250
10	3,200	3,370	3,370			2,550	4,100	15,200	12,800	6,260	3,910	1,980
11	3,370	3,200	3,370			1,980	3,910	14,800	13,600	6,020	4,300	1,850
12	3,540	3,200	3,370			2,400	3,540	14,400	14,400	5,330	4,700	1,980
13	3,040	3,370	3,370			2,860	3,910	13,200	14,800	4,700	3,540	1,850
14	2,880	3,370	3,370			3,540	4,300	13,200	15,200	5,330	2,700	2,110
15	3,200	3,370	3,370			3,190	4,700	15,200	15,700	5,780	2,250	2,860
16	3,200	3,370	3,280			3,190	4,700	17,100	16,100	6,260	1,980	3,720
17	2,880	3,200	3,200			3,190	4,700	18,200	16,100	6,020	1,980	3,910
18	3,040	2,880	3,040			3,020	5,110	19,800	16,600	5,330	1,850	3,360
19	3,200	3,200	2,880			3,540	6,500	22,100	14,400	5,110	1,730	3,190
20	3,200	3,200	2,780			3,910	8,680	25,600	14,460	4,700	1,730	3,020
21	3,540	3,200	2,580			4,500	11,300	27,200	14,000	4,500	1,620	2,700
22	3,540	3,200	2,580			5,550	13,200	30,500	14,000	4,300	1,430	2,700
23	3,200	3,200	2,510			6,020	15,700	30,500	13,200	3,910	1,520	2,400
24	3,370	3,200	2,440			5,550	17,100	28,800	12,000	3,360	1,430	2,250
25	3,720	2,880	2,370			5,110	17,600	29,600	10,900	3,020	1,350	2,110
26	3,910	3,040	2,370			4,700	17,600	28,800	10,600	2,860	1,270	2,110
27	3,720	3,200	2,300			4,300	16,100	28,800	10,300	2,550	1,270	2,110
28	3,540	3,200	2,300			4,300	15,700	30,500	9,940	2,550	1,270	2,110
29	3,370	3,200	2,300			4,500	14,000	32,200	8,990	2,700	1,270	2,110
30	3,540	3,370	2,300			5,110	12,800	32,200	8,680	3,360	1,270	1,850
31	3,540		2,300			5,550		30,500		4,700	1,270	

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Daily discharge, in second-feet, of Colorado River near Fruita, Colo., for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919-20												
1	1,850	2,700	2,800	2,720	2,600	2,700	3,020	8,090	71,100	28,800	7,810	3,200
2	1,850	2,700	2,770	2,740	2,600	3,100	3,190	11,300	68,100	27,200	7,530	2,880
3	1,850	2,700	2,800	2,780	2,700	4,300	3,190	14,800	63,100	26,400	8,990	2,730
4	1,980	2,800	2,820	2,830	2,780	3,280	3,020	15,200	59,100	25,600	9,940	2,580
5	1,980	2,860	2,730	3,000	2,850	2,700	2,860	17,100	54,100	24,100	9,300	3,200
6	1,980	2,860	2,730	2,750	2,820	2,550	2,860	20,300	55,100	24,100	9,300	3,200
7	2,110	3,020	2,650	2,600	2,830	2,550	2,860	21,500	58,100	19,800	8,600	3,200
8	1,980	3,020	2,450	2,540	2,730	2,250	3,360	24,800	59,100	17,100	7,480	3,040
9	1,850	3,020	2,300	2,500	2,760	2,250	4,100	27,200	61,100	16,600	6,850	3,200
10	2,110	3,100	2,150	2,480	2,780	2,550	4,900	32,200	59,100	15,700	6,610	3,200
11	2,250	2,860	2,180	2,420	2,830	2,700	5,330	32,200	59,100	14,800	5,920	3,370
12	1,980	2,860	2,200	2,470	2,880	2,860	4,900	28,800	57,100	14,400	4,960	3,370
13	2,110	2,860	2,180	2,470	2,940	2,700	4,700	27,200	53,100	13,600	3,820	3,200
14	2,110	2,860	2,250	2,480	3,000	2,860	4,900	30,500	49,100	12,800	4,200	3,040
15	2,550	2,700	2,180	2,500	3,050	2,860	4,700	35,800	49,100	12,800	4,860	2,880
16	2,700	2,700	2,140	2,500	3,160	2,700	5,330	31,400	49,100	12,000	4,670	2,880
17	2,550	2,860	2,170	2,520	3,180	2,550	7,000	28,600	47,100	12,000	4,480	2,730
18	2,550	2,860	2,300	2,580	3,260	2,580	6,260	32,200	41,400	11,300	4,200	2,730
19	2,550	2,860	2,420	2,500	3,350	2,860	4,900	38,600	37,600	11,300	3,820	2,730
20	2,400	3,100	2,540	2,620	3,520	3,020	4,300	51,100	33,100	10,600	3,630	2,730
21	2,400	2,860	2,570	2,640	3,550	3,190	4,100	57,100	32,200	9,940	3,910	2,730
22	2,250	2,860	2,650	2,670	3,550	3,190	4,100	65,100	30,500	9,620	4,290	2,880
23	2,250	2,700	2,600	2,680	3,500	3,540	3,910	77,100	31,400	9,620	4,670	3,040
24	2,400	2,700	2,660	2,680	3,350	3,540	3,910	69,100	32,200	9,300	4,860	3,040
25	2,400	2,700	2,530	2,680	3,100	3,190	3,910	71,100	33,100	9,940	4,860	3,200
26	2,550	2,700	2,700	2,700	2,860	3,020	3,910	71,100	34,000	10,600	4,100	3,200
27	3,020	2,550	2,800	2,650	2,480	3,190	3,910	73,100	31,400	12,400	3,540	3,200
28	2,700	2,460	2,640	2,500	2,550	3,360	3,910	69,100	30,500	11,300	3,540	3,540
29	2,620	2,430	2,750	2,480	2,550	3,190	3,910	67,100	29,600	9,300	3,540	3,910
30	2,700	2,460	2,670	2,540	-------	3,020	4,700	68,100	28,800	8,090	3,540	3,910
31	2,860	-------	2,700	2,600	-------	3,020	-------	71,100	-------	8,090	3,540	-------

NOTE.—Stage-discharge relation affected by ice Nov. 26 to Dec. 2, 6, 7, 13-16, 29-31, 1918; Jan. 1, 1919 to Mar. 2, 1919, Nov. 28 to Dec. 12, and Dec. 15, 1919, to Feb. 24, 1920; daily discharge determined except for January and February, 1919, from study of weather records, gage height, and observer's notes, and by comparison with combined discharge of Colorado River at Glenwood Springs and Gunnison River near Grand Junction. Estimated monthly mean discharge, ascertained from combined flow of Colorado River at Glenwood Springs and Gunnison River near Grand Junction, allowing for inflow between stations or January, 1919, 2,210 second-feet and February, 1919, 2,200 second-feet.

Monthly discharge of Colorado River near Fruita, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	3,910	2,880	3,330	205,000
November	3,720	2,880	3,330	198,000
December	3,370	2,300	2,970	183,000
January	----------	----------	2,210	136,000
February	----------	----------	2,200	122,000
March	6,020	1,980	3,620	223,000
April	17,600	3,540	8,730	519,000
May	32,200	12,800	21,000	1,290,000
June	27,200	8,680	14,000	833,000
July	8,380	2,550	5,410	333,000
August	7,260	1,270	3,100	191,000
September	3,910	1,350	2,260	134,000
The year	32,200	1,270	6,030	4,370,000

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Monthly discharge of Colorado River near Fruita, Colo., for the years ending Sept. 30, 1919 and 1920—Continued

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919-20				
October	3,030	1,860	2,300	141,000
November	3,100	2,430	2,790	166,000
December			2,520	155,000
January			2,610	160,000
February			2,970	171,000
March	4,300	2,250	2,960	181,000
April	7,000	2,860	4,200	250,000
May	77,100	8,090	41,500	2,550,000
June	71,100	28,800	46,600	2,770,000
July	28,800	8,090	14,800	910,000
August	9,940	3,540	5,530	340,000
September	3,910	2,580	3,090	184,000
The year	77,100		11,000	7,980,000

COLORADO RIVER NEAR TOPOCK, ARIZ.

LOCATION.—In E. ½ sec. 16, T. 7 N., R. 24 E., at head of canyon 1¾ miles below Atchison, Topeka & Santa Fe Railway bridge at Topock, Mohave County, and 16 miles (by main channel of river) below Needles, Calif.

DRAINAGE AREA.—171,000 square miles (169,000 square miles at Hardyville, Ariz., plus about 2,000 square miles between Hardyville and gaging station).

RECORDS AVAILABLE.—February 1, 1917, to September 30, 1920.

GAGE.—Stevens water-stage recorder on right bank just above point where river rapidly narrows and enters rock canyon; inspected by G. M. Bobst.

DISCHARGE MEASUREMENTS.—Made from cable just below gage.

CHANNEL AND CONTROL.—Above gage channel is wide and bed, composed of loose sand, is constantly shifting. At low stages large sand bars form numerous islands between Topock and the gage. Below gage, river enters steep-walled rock canyon and channel rapidly narrows from 800 to 400 feet. Bed in canyon shifts during floods. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 14.55 feet June 4 (discharge, 77,300 second-feet); minimum discharge, 4,100 second-feet on January 16.

Maximum stage during year ending September 30, 1920, from water-stage recorder, 26.1 feet at noon June 1 (discharge, 156,000 second-feet); minimum discharge, 5,440 second-feet, by current-meter measurement on January 22.

1917–1920: Maximum discharge recorded, 156,000 second-feet at gage height of 27 feet (determined from flood marks on gage) about July 1, 1917, and at gage height of 26.1 feet at noon June 1, 1920; minimum discharge, 4,100 second-feet January 16, 1920.

DIVERSIONS.—Water is diverted for irrigation and the development of power from main river and tributaries above station.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve fairly well defined below 90,000 second-feet. Operation of water-stage recorder satisfactory except as noted in footnote to table of daily discharge. Daily discharge ascertained by shifting-control method except for periods during which recorder did not operate as indicated in footnote to table of daily discharge. Records fair.

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Discharge measurements of Colorado River near Topock, Ariz., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1918		*Feet*	*Sec.-ft.*	1919		*Feet*	*Sec.-ft.*
Dec. 12	J. F. Kunesh	4.58	7,800	Dec. 18	J. F. Kunesh	4.53	6,760
13	do	4.90	8,650	1920			
1919				Jan. 5	G. M. Bobst	5.34	7,520
Jan. 25	do	4.79	5,850	13	do	5.94	10,200
Feb. 17	do	5.42	7,290	22	do	4.95	5,440
Mar. 6	do	5.66	7,350	Feb. 1	J. F. Kunesh	6.45	10,900
22	Kunesh and Bobst	6.45	11,200	17	G. M. Bobst	7.68	12,560
Apr. 9	do	9.30	26,100	28	do	10.84	33,060
21	G. M. Bobst	7.98	18,300	Mar. 2	J. F. Kunesh	6.58	18,800
28	do	11.65	34,200	10	G. M. Bobst	6.61	17,100
May 5	do	11.05	29,400	18	do	5.28	10,300
10	Kunesh and Bobst	11.05	41,900	26	do	6.41	15,300
24	G. M. Bobst	12.50	48,800	Apr. 19	do	11.00	28,800
June 3	do	14.45	76,500	May 9	do	13.68	49,600
9	Kunesh and Bobst	9.34	46,400	13	do	16.68	67,900
16	G. M. Bobst	7.00	31,100	17	do	17.00	68,000
23	do	8.88	39,800	22	do	16.43	83,400
July 1	do	6.90	26,200	June 5	Kunesh and Bobst	23.85	110,000
13	Kunesh and Bobst	6.52	19,600	13	G. M. Bobst	17.65	94,460
Aug. 3	G. M. Bobst	4.15	15,700	19	do	16.75	83,000
16	do	4.8	17,300	25	do	12.10	45,000
26	J. F. Kunesh	3.65	7,570	July 6	do	10.55	56,300
Sept. 2	G. M. Bobst	2.89	4,800	13	Kunesh and Bobst	7.13	44,700
10	do	2.94	4,900	20	G. M. Bobst	6.10	31,000
16	do	4.25	7,960	31	do	5.30	28,200
24	do	4.75	7,210	Aug. 5	do	5.68	23,300
30	J. F. Kunesh	4.71	7,670	11	do	5.52	24,100
Oct. 7	G. M. Bobst	3.98	9,840	18	do	4.65	24,100
14	do	3.34	8,120	25	do	5.90	24,560
22	do	4.91	7,890	Sept. 4	do	4.15	10,200
28	do	5.35	11,300	11	do	3.65	9,440
Nov. 4	do	5.68	9,230	21	do	3.75	8,690
11	do	5.64	7,630	29	Sopp and Bobst	3.50	8,330
25	do	5.68	10,500				

Daily discharge, in second-feet, of Colorado River near Topock, Ariz., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918-19												
1	9,350	9,850	8,600	7,200	6,250	7,200	23,000	41,600	71,000	25,800	15,700	4,900
2	9,850	9,600	8,400	6,900	6,800	7,600	21,800	43,200	73,800	24,000	14,600	4,750
3	10,100	10,100	8,200	6,600	6,800	8,000	20,600	42,600	76,600	22,600	17,800	4,450
3	10,600	9,850	8,200	6,400	6,800	7,800	21,500	39,400	77,300	22,600	18,200	4,900
5	10,100	9,850	8,000	5,950	6,800	7,800	22,400	37,300	76,600	21,400	18,200	4,900
6	9,350	10,100	7,800	5,800	6,800	7,600	23,400	35,800	69,600	20,200	17,800	5,500
7	9,100	9,850	8,000	5,800	7,000	7,600	24,300	35,800	57,200	19,400	29,400	5,050
8	9,350	9,850	8,000	5,350	7,200	7,800	25,200	37,800	50,600	19,400	37,300	5,050
9	9,350	9,600	8,000	5,050	7,000	7,800	26,200	38,300	47,000	21,000	34,800	4,900
10	9,350	9,600	9,100	4,900	7,400	8,400	24,800	40,400	43,200	20,600	32,300	5,050
11	9,350	9,850	8,200	4,750	7,400	9,100	23,500	43,800	41,000	20,200	29,800	5,500
12	9,100	9,600	8,000	4,600	7,600	9,600	23,000	44,300	39,000	20,200	27,300	6,400
13	9,100	9,850	8,850	4,450	7,600	9,350	22,200	43,800	37,000	19,400	24,900	6,800
14	9,350	9,850	9,100	4,450	7,600	9,100	20,600	42,100	35,100	21,800	22,400	7,400
15	9,350	9,600	9,100	4,200	7,600	8,850	18,600	42,100	33,100	25,300	19,900	8,600
16	9,350	9,600	9,100	4,100	7,400	8,600	17,800	39,900	31,100	21,800	17,400	7,800
17	10,100	9,350	9,350	4,900	7,400	8,600	17,100	36,800	33,700	21,400	16,400	7,400
18	10,600	9,100	9,350	5,650	8,400	8,850	16,000	33,300	36,300	26,200	15,400	8,000
19	9,600	9,100	8,850	5,950	8,200	9,100	16,400	32,300	37,800	29,400	14,000	8,000
20	9,600	8,850	9,100	6,250	7,600	10,400	17,800	34,300	38,300	38,800	12,700	8,600
21	9,850	8,600	8,850	6,100	7,600	11,500	18,600	37,300	39,400	40,400	11,800	6,800
22	10,400	8,600	8,600	6,100	7,600	11,500	18,200	40,400	41,000	38,300	10,400	8,000
23	9,850	8,600	8,200	6,100	7,400	11,800	18,200	44,300	38,800	35,000	9,600	7,200
24	9,600	9,100	8,000	5,950	7,200	11,500	19,400	48,800	37,800	31,600	9,100	7,200
25	9,850	9,600	8,000	5,950	7,000	13,000	23,000	51,600	35,800	28,200	8,400	7,600
26	9,350	9,350	8,200	5,950	6,800	16,000	27,600	54,400	34,300	24,900	7,600	8,400
27	9,600	9,100	8,600	5,950	6,800	20,200	30,300	57,100	32,300	21,600	7,000	8,600
28	10,400	8,850	8,400	6,100	7,000	24,000	34,300	59,900	29,800	18,200	6,400	8,0[illegible]
29	11,500	8,600	8,100	6,100	.....	26,200	38,300	62,700	28,400	21,800	5,800	7,[illegible]
30	10,600	8,600	7,800	6,100	.....	24,000	41,000	65,500	26,600	17,800	5,650	7,[illegible]
31	10,100	.....	7,500	5,950	.....	22,600	.....	68,300	.....	16,000	5,350	.....

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Daily discharge, in second-feet, of Colorado River near Topock, Ariz., for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919–20												
1	8,000	11,800	25,800	7,200	10,900	22,200	17,400		155,000	49,900	26,600	13,000
2	8,600	10,600	18,600	7,200	10,600	19,000	16,800		152,000	51,100	27,100	11,800
3	8,850	10,100	15,700	7,200	10,400	16,400	16,400		147,000	52,300	26,200	10,900
4	8,850	9,350	14,300	7,400	9,600	17,800	15,400		143,000	53,600	25,800	10,100
5	9,100	8,850	13,000	7,400	10,100	16,400	15,400	33,000	139,000	54,800	23,000	10,100
6	9,600	8,400	11,200	7,400	10,600	15,400	14,300		138,000	56,000	25,800	9,880
7	9,850	8,000	10,100	7,600	10,600	14,300	13,600		139,000	55,600	27,100	10,100
8	9,850	7,800	9,600	8,000	11,500	15,400	13,300		137,000	55,200	27,100	10,100
9	9,850	7,600	18,600	7,800	12,700	16,800	13,300	50,000	130,000	54,800	27,100	10,100
10	9,600	7,200	20,600	9,350	12,400	17,100	12,700	54,500	117,000	52,300	26,200	10,100
11	9,600	7,600	14,300	10,900	12,400	16,000	12,400	60,000	105,000	49,800	24,000	9,600
12	10,100	7,800	11,800	11,200	14,000	13,600	12,400	63,200	96,000	47,300	23,000	9,350
13	10,400	7,800	11,800	10,400	22,200	12,700	13,300	67,600	91,000	44,800	24,400	9,100
14	10,600	8,200	11,200	9,100	17,100	12,100	15,000	70,200	89,500	43,200	24,000	9,600
15	9,850	8,400	10,400	8,000	15,000	11,500	17,400	75,000	90,100	40,400	24,400	9,350
16	10,400	8,600	9,100	7,400	13,000	10,900	21,800	73,600	91,500	38,800	25,300	9,350
17	9,600	9,100	8,000	7,000	12,700	10,600	23,000	67,600	86,600	36,300	24,800	9,600
18	8,850	9,350	7,000	6,400	13,000	10,400	26,200	67,000	85,300	34,800	24,400	9,350
19	8,600	9,100	6,250	6,100	13,800	10,400	29,400	71,000	86,000	32,300	23,000	9,100
20	8,850	9,600	6,100	5,650	13,300	10,600		75,000	79,200	30,300	21,800	8,850
21	8,200	10,100	6,250	5,650	14,000	11,500		80,000	72,300	29,400	23,000	8,850
22	7,800	10,100	6,800	5,500	14,600	13,000		83,800	65,500	28,900	22,600	8,850
23	8,000	10,400	7,000	5,650	15,400	14,000		86,000	58,700	28,000	26,200	8,850
24	8,400	10,600	6,400	5,560	19,800	14,600		97,300	51,800	28,000	26,200	8,600
25	9,100	10,600	6,100	5,650	51,200	14,600	33,000	108,000	45,000	28,000	23,500	8,850
26	9,850	10,600	5,800	5,950	58,400	15,400		116,000	45,600	28,400	20,200	8,400
27	10,100	11,200	5,500	8,850	41,600	15,700		136,000	46,200	28,000	18,200	8,000
28	11,200	10,600	6,100	10,100	31,800	17,100		147,000	46,900	28,400	17,400	8,200
29	9,850	11,500	6,600	11,800	28,400	19,800		152,000	47,500	28,000	16,400	8,200
30	9,850	10,900	7,200	12,400	-------	19,000		150,000	48,700	28,000	15,000	8,000
31	11,200	-------	7,200	11,800	-------	19,000	-------	151,000	-------	28,000	14,000	-------

NOTE.—Water-stage recorder not operating properly; discharge interpolated Dec. 29, 1918, to Jan. 2, 1919, Apr. 4–8, May 25 to June 2, June 12–15, 17, July 23–27, Aug. 9–15, 17, 1919, Apr. 18, June 20–24, 26–28, 30, and July 1–5, 7, 8, 10–12, 1920. Staff gage readings used Apr. 19, June 25, 29, and July 6, 1920. Braced figures show mean discharge for periods estimated on account of lack of gage-height record.

Monthly discharge of Colorado River near Topock, Ariz., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	11,500	9,100	9,780	601,000
November	10,100	8,600	9,400	559,000
December	9,350	7,500	8,440	519,000
January	7,200	4,100	5,660	348,000
February	8,400	6,250	7,250	403,000
March	26,200	7,200	11,700	719,000
April	41,000	16,000	23,200	1,380,000
May	68,300	32,300	44,400	2,730,000
June	77,300	26,600	45,000	2,680,000
July	40,400	16,000	24,400	1,500,000
August	37,300	5,350	16,900	1,040,000
September	8,600	4,450	6,680	397,000
The year	77,300	4,100	17,800	12,900,000
1919–20				
October	11,200	7,800	9,440	580,000
November	11,800	7,200	9,400	559,000
December	25,800	5,500	10,500	646,000
January	12,400	5,500	7,990	491,000
February	58,400	9,600	18,300	1,050,000
March	22,200	10,400	14,900	916,000
April	-------	12,400	22,800	1,360,000
May	152,000	-------	76,300	4,690,000
June	155,000	45,000	94,200	5,610,000
July	56,000	28,000	40,100	2,470,000
August	27,100	14,000	23,300	1,430,000
September	13,000	8,000	9,470	564,000
The year	155,000	5,500	28,100	20,400,000

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COLORADO RIVER AT YUMA, ARIZ.

LOCATION.—In NE. ¼ NE. ¼ sec. 21, T. 8 S., R. 23 W., Gila and Salt River base and meridian, 100 feet upstream from Southern Pacific Railroad bridge at Yuma, Yuma County. Since the change in channel on June 7, 1920, Gila River enters from the east about 4 miles upstream from this station.

DRAINAGE AREA.—242,000 square miles (measured on map compiled from best available maps of the Colorado River basin).

RECORDS AVAILABLE.—January 1, 1902, to September 30, 1920; gage heights have been collected since April 1, 1878, but discharge has not been computed owing to lack of discharge measurements.

GAGE.—Vertical staff in two sections on left bank; zero of gage is 102.1 feet above mean sea level.

DISCHARGE MEASUREMENTS.—Made from cable 1,000 feet below gage.

CHANNEL AND CONTROL.—Bed composed of shifting sand. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge during year ending September 30, 1919, 57,600 second-feet on June 7; minimum mean daily discharge, 1,800 second-feet on January 16.

Maximum mean daily discharge during year ending September 30, 1920, 190,000 second-feet on June 8. Extract from report by D. C. McConaughy, assistant engineer, United States Bureau of Reclamation, regarding this high water is as follows: The maximum discharge of Colorado River for year 1920 was 190,000 second-feet, occurring on June 8 from upper Colorado watershed. On the night of June 7, about 11 p. m., the river broke through a cut-off above the gage releasing 18,000 acre-feet of overflow storage and increasing the peak discharge from 20,000 to 25,000 second-feet. The true peak discharge was, therefore, probably about 175,000 second-feet instead of 190,000 second-feet. The gage height on June 8 was 30.35 feet. Gila River was dry from May 21 to November 8, 1920. Minimum mean daily discharge 3,700 second-feet on October 10.

1902–1920: Maximum mean daily discharge, 240,000 second-feet January 22, 1916; minimum mean daily discharge, 1,800 second-feet January 16, 1919.

DIVERSIONS.—Water is diverted for irrigation and power from main river and tributaries above station.

REGULATION.—Flow temporarily affected at times by sluicing at Laguna dam about 12 miles upstream.

COOPERATION.—Complete records furnished by United States Bureau of Reclamation. The data have been revised slightly to conform to computation rules used by the United States Geological Survey.

Discharge measurements of Colorado River at Yuma, Ariz., during the years ending Sept. 30, 1919 and 1920

[Made by U. S. Bureau of Reclamation]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
1918	*Feet*	*Sec.-ft.*	1918	*Feet*	*Sec.-ft.*	1918	*Feet*	*Sec.-ft.*
Oct. 2	15.00	6,600	Oct. 21	15.60	7,700	Nov. 8	15.90	7,800
4	15.80	8,500	23	14.90	6,800	11	16.20	8,200
7	14.50	8,900	25	15.60	8,000	13	16.00	8,700
9	14.20	8,000	28	15.70	8,500	15	16.10	8,300
11	14.10	7,700	30	15.50	7,300	18	15.90	7,300
14	14.20	5,800	Nov. 1	16.30	9,200	20	16.10	7,600
16	14.10	6,500	4	15.50	7,600	22	16.00	7,600
18	14.50	6,300	6	15.90	8,000	25	16.10	8,300

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Discharge measurements of Colorado River at Yuma, Ariz., during the years ending Sept. 30, 1919 and 1920—Continued

Date	Gage height	Discharge
1918	*Feet*	*Sec.-ft.*
Nov. 27	16.30	8,300
29	16.20	8,100
Dec. 2	15.90	7,200
4	16.00	7,300
6	16.20	7,600
9	15.90	6,800
11	16.00	6,800
13	16.60	7,800
16	16.00	6,700
18	16.50	7,200
20	16.85	8,400
23	16.60	8,200
26	16.10	7,200
27	16.00	7,200
30	16.30	7,200
1919		
Jan. 2	15.70	6,000
3	15.60	4,900
6	15.20	4,800
8	14.80	4,400
10	14.60	3,600
13	13.40	2,300
15	13.40	1,900
17	13.60	2,300
20	13.40	2,300
22	14.80	4,100
24	15.00	4,200
27	14.50	3,300
29	14.80	4,300
31	15.00	4,400
Feb. 3	15.60	5,300
5	16.70	8,800
7	16.50	8,000
10	15.90	6,300
12	15.90	5,800
14	16.00	6,200
17	16.20	7,500
19	16.10	6,900
21	16.60	8,900
24	16.00	6,700
26	16.30	7,500
28	16.10	7,200
Mar. 3	15.80	7,300
5	15.80	6,800
7	15.70	6,700
10	15.80	7,000
12	15.40	5,700
14	16.00	7,400
17	15.90	7,300
19	15.70	6,700
21	15.70	6,600
24	16.30	8,900
26	16.30	8,900
28	16.90	12,000
31	19.00	24,100
Apr. 2	18.70	21,200
4	18.50	20,400
7	18.50	19,800
9	18.80	23,400
11	18.80	26,300
14	18.80	24,200
16	18.40	20,300
18	18.00	17,500
21	17.50	14,000
23	17.70	15,800
25	17.70	16,200
28	18.70	21,400
30	20.00	29,000
May 2	20.90	32,000
5	21.50	36,000
7	21.20	33,200
9	20.80	31,400
12	20.90	33,500
14	21.30	37,400
16	21.30	34,700
19	20.80	32,900
21	20.30	28,000

Date	Gage height	Discharge
1919	*Feet*	*Sec.-ft.*
May 23	20.80	34,800
26	21.60	39,300
28	22.20	44,000
31	23.30	50,700
June 2	23.30	50,600
4	23.20	51,000
6	23.30	57,600
9	22.60	52,300
11	20.50	37,400
13	19.30	26,600
16	18.30	23,200
18	18.10	23,000
20	18.70	25,000
23	19.00	27,600
25	18.80	25,200
27	18.60	23,800
30	18.00	20,600
July 2	17.90	18,300
5	17.30	18,000
7	16.90	17,400
9	16.50	13,400
11	16.80	15,500
14	17.40	15,300
16	17.70	16,200
18	18.50	21,000
21	20.40	28,500
23	20.80	33,000
25	20.90	35,600
28	17.90	16,400
30	16.90	12,600
Aug. 1	16.60	11,400
4	16.60	13,000
6	18.30	19,600
8	16.60	11,500
11	18.60	18,900
13	17.60	13,800
15	16.90	10,100
18	16.60	10,100
20	16.10	8,000
22	15.70	6,500
25	15.80	7,300
27	15.30	5,000
29	15.30	4,600
Sept. 2	14.70	3,000
3	14.70	3,000
5	14.60	2,700
8	14.40	2,300
12	15.10	4,100
15	15.50	5,000
17	16.15	5,800
19	16.35	6,300
22	16.50	6,700
24	17.00	7,800
26	16.30	5,500
29	16.90	8,200
Oct. 1	16.50	6,800
3	16.50	6,200
6	16.10	4,700
8	15.90	4,000
10	15.90	3,700
13	15.90	4,200
15	16.00	4,900
17	15.90	3,800
20	16.20	4,100
22	16.50	5,400
24	17.10	6,400
27	16.20	5,100
29	17.00	7,200
31	16.70	7,300
Nov. 3	16.90	9,100
5	16.70	7,200
7	16.70	7,200
10	16.50	5,800
12	16.50	6,000
14	16.50	6,300
17	16.30	6,000
19	16.50	6,400
21	16.50	6,100

Date	Gage height	Discharge
1919	*Feet*	*Sec.-ft.*
Nov. 24	16.70	6,600
26	16.50	6,400
28	17.00	7,900
30	28.15	82,600
Dec. 1	22.90	46,100
3	18.40	22,900
5	18.40	20,200
8	20.30	34,400
10	17.70	17,900
12	19.00	26,100
15	16.90	12,500
17	16.50	10,000
19	16.00	8,500
22	15.50	7,400
24	15.60	7,800
26	15.60	7,700
29	15.10	5,600
31	15.30	6,600
1920		
Jan. 2	15.60	6,900
5	16.20	8,800
7	20.40	32,500
9	18.50	17,900
12	16.80	11,600
14	17.10	12,000
16	16.80	10,700
19	16.30	8,700
21	16.40	8,800
23	16.00	7,400
26	16.30	8,100
28	16.50	8,900
30	17.40	13,700
Feb. 2	17.80	14,200
4	17.30	11,700
6	17.00	10,100
9	17.10	9,800
11	19.95	26,100
13	22.10	41,200
16	20.10	31,200
18	18.60	23,300
20	17.60	15,900
23	22.35	49,200
24	29.75	123,100
26	27.25	99,900
28	22.80	65,100
Mar. 1	20.65	53,700
3	17.95	33,300
5	16.55	23,000
8	15.80	19,000
10	15.30	16,800
12	15.80	17,600
15	15.40	13,600
17	15.50	13,400
19	15.20	11,400
22	15.00	10,100
24	15.20	10,200
26	15.70	11,300
29	16.20	12,300
31	17.70	19,700
Apr. 2	17.80	20,800
5	17.10	21,900
7	16.70	17,400
9	16.50	14,900
12	16.40	12,900
14	16.00	12,900
16	16.35	14,000
19	18.05	20,800
21	18.90	24,500
23	19.55	33,400
26	19.15	27,300
28	18.10	22,200
30	17.60	18,300
May 3	17.20	16,300
5	17.50	17,700
7	18.40	23,300
10	20.25	31,000
12	20.80	38,800

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Discharge measurements of Colorado River at Yuma, Ariz., during the years ending Sept. 30, 1919 and 1920—Continued

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
1920	*Feet*	*Sec.-ft.*	1920	*Feet*	*Sec.-ft.*	1920	*Feet*	*Sec.-ft.*
May 14	21.60	45,000	June 30	21.40	73,800	Aug. 16	16.6	17,600
17	22.40	51,000	July 2	21.9	72,700	18	16.1	14,400
19	23.05	54,400	3	22.0	70,800	20	15.9	13,600
21	23.40	57,400	6	22.4	71,100	23	15.8	12,600
24	23.65	62,500	7	22.3	66,000	25	16.4	15,600
26	24.00	68,300	9	21.7	60,400	27	17.1	17,160
28	24.15	68,200	12	20.8	53,100	30	16.4	13,900
31	24.95	81,100	14	19.5	44,500	Sept. 1	16.10	12,200
June 2	26.75	105,800	16	18.3	35,800	4	16.20	11,700
4	28.45	142,200	19	17.9	30,500	7	15.60	8,500
6	29.85	162,800	21	17.8	30,000	8	15.50	8,400
7	30.15	177,900	23	17.4	26,000	10	15.60	7,800
9	29.70	163,000	26	17.2	23,700	13	15.40	7,900
11	29.40	162,500	28	17.1	23,300	15	15.40	7,200
14	28.60	159,100	30	16.6	19,300	18	16.00	8,300
16	26.55	123,200	Aug. 2	16.2	19,700	20	16.00	7,900
18	26.10	125,100	4	16.3	21,100	22	15.80	7,800
21	25.20	119,000	7	16.4	20,200	24	15.80	7,200
23	24.90	114,400	9	17.5	23,200	27	15.50	6,000
25	24.35	108,000	11	17.6	21,100	29	15.60	5,300
28	22.05	84,800	13	17.0	19,100			

Daily discharge, in second-feet, of Colorado River at Yuma, Ariz., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918-19												
1	6,500	9,200	7,600	6,200	4,700	7,600	21,300	30,600	50,600	18,000	11,400	3,000
2	6,600	9,000	7,200	6,000	5,000	7,500	21,200	32,600	50,600	18,300	12,000	3,000
3	7,000	8,000	7,300	5,000	5,300	7,300	20,900	35,300	51,200	18,200	12,500	3,000
4	8,500	7,600	7,300	5,100	8,200	7,000	20,400	36,100	51,000	18,100	13,000	2,900
5	14,000	7,800	7,400	5,100	8,800	6,800	20,000	36,500	54,500	18,000	16,300	2,700
6	9,000	8,000	7,600	4,800	8,500	6,800	19,800	34,800	57,600	17,500	19,600	3,100
7	8,900	7,800	6,900	4,200	8,600	6,700	19,800	33,200	57,000	17,400	15,600	3,000
8	8,100	7,800	6,900	4,000	8,200	6,800	21,600	31,900	55,600	15,400	11,500	2,300
9	8,000	8,100	6,800	4,400	7,600	6,900	23,400	31,400	52,300	13,400	16,200	2,800
10	7,900	8,100	6,800	3,600	6,300	7,000	24,800	34,000	44,900	13,000	20,500	3,600
11	7,700	8,200	6,800	3,800	5,800	5,600	26,300	33,400	37,400	15,500	18,900	3,800
12	8,100	8,300	7,000	3,600	5,800	5,700	27,000	33,500	30,200	15,000	16,400	4,100
13	8,200	8,500	7,800	2,300	6,100	6,500	25,000	36,400	26,600	15,400	13,800	4,100
14	5,800	8,400	6,900	2,000	6,200	7,400	24,200	37,400	25,900	15,300	12,000	4,500
15	6,400	8,300	6,800	1,900	7,500	7,600	23,300	36,100	23,900	15,800	10,100	5,000
16	6,500	8,200	6,700	1,800	7,600	7,500	20,300	34,700	23,200	16,300	10,000	5,500
17	6,000	8,000	7,100	2,300	7,500	7,300	17,900	34,400	23,000	18,700	10,000	5,800
18	6,300	7,300	7,200	2,300	7,200	7,000	17,500	34,100	23,000	21,000	10,100	6,600
19	6,500	7,400	7,500	2,200	6,900	6,700	16,400	32,900	24,400	28,300	9,100	6,300
20	7,600	7,600	8,400	2,300	7,400	6,500	15,400	30,500	25,000	28,400	8,000	6,200
21	7,700	7,300	8,300	3,900	8,900	6,600	14,600	28,600	27,100	28,500	7,300	7,600
22	7,000	7,600	8,300	4,100	8,700	8,700	15,000	31,100	26,000	35,000	6,500	6,700
23	6,800	7,800	8,200	4,100	7,700	9,200	15,800	34,800	27,600	33,000	6,800	7,300
24	7,900	8,400	8,300	4,200	6,700	8,900	16,000	36,200	25,200	34,500	7,000	7,800
25	8,000	8,300	7,400	3,300	7,500	8,900	16,200	37,900	25,200	35,600	7,300	6,700
26	7,900	8,200	7,200	3,500	7,500	8,900	17,900	39,300	23,300	27,000	6,260	5,500
27	8,200	8,300	7,200	3,300	7,300	9,200	19,600	42,200	22,300	20,500	5,000	6,300
28	8,500	8,200	7,100	4,200	7,200	12,000	21,400	44,000	22,300	16,300	4,800	8,800
29	7,000	8,100	7,200	4,300	.....	16,800	25,300	46,000	21,800	14,500	4,600	8,200
30	7,300	7,800	7,200	4,400	.....	22,400	29,000	49,200	20,600	12,600	4,300	8,500
31	8,900	.....	7,200	4,400	.....	24,100	.....	50,700	.....	12,000	4,500	.....

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Daily discharge, in second-feet, of Colorado River at Yuma, Ariz., for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919–20												
1	6,800	7,200	46,100	6,800	14,900	53,700	19,900	17,200	96,000	73,000	19,600	12,200
2	6,500	7,300	25,000	6,900	14,200	42,200	20,800	15,800	106,000	72,700	19,700	12,300
3	6,200	9,100	22,900	7,200	13,000	38,300	21,100	16,300	126,000	70,800	21,300	13,300
4	7,000	8,200	23,200	8,200	11,700	26,200	21,580	17,100	142,000	70,900	21,100	11,700
5	5,700	7,200	20,200	8,800	10,500	23,000	21,900	17,700	155,000	71,000	21,600	9,400
6	4,700	7,200	20,000	16,500	10,100	25,200	18,300	18,800	164,000	71,100	22,500	8,700
7	4,300	7,200	22,000	32,500	9,600	21,000	17,400	23,200	178,000	66,000	20,200	8,500
8	4,000	6,900	24,400	23,600	9,000	19,000	16,200	29,000	*190,000	62,500	22,700	8,400
9	3,900	5,800	24,400	17,900	9,800	17,200	14,900	30,600	163,000	60,400	23,200	8,400
10	3,700	5,800	17,900	14,500	13,600	16,800	15,000	31,000	162,000	58,300	21,300	7,800
11	4,600	5,900	22,000	12,700	26,100	17,400	13,400	35,500	160,000	54,900	21,700	8,500
12	4,900	6,000	26,100	11,600	37,300	17,600	12,900	38,800	162,000	53,100	19,500	8,700
13	4,200	6,200	19,300	12,700	41,200	17,500	12,900	41,300	160,000	45,200	19,100	7,900
14	5,000	6,300	15,000	12,000	37,300	15,600	12,900	45,000	159,000	44,500	18,100	8,100
15	4,900	6,300	12,500	11,600	34,300	13,600	13,200	47,500	140,000	37,000	18,100	7,200
16	4,300	6,200	11,500	10,700	31,200	13,600	14,000	49,000	123,000	35,800	17,600	10,200
17	3,800	6,000	10,000	9,800	25,800	13,400	17,500	51,000	124,000	33,000	15,300	9,300
18	4,200	6,200	9,000	9,000	23,300	12,600	20,500	52,700	125,000	29,500	14,400	8,200
19	4,300	6,400	8,500	8,700	20,200	11,400	20,800	54,400	124,000	30,500	14,300	7,800
20	4,100	6,400	8,000	8,700	15,900	11,000	22,000	57,000	120,000	30,200	13,600	7,900
21	4,700	6,100	7,800	8,800	24,300	10,900	24,500	57,400	119,000	30,000	12,900	7,900
22	5,400	6,600	7,400	7,500	26,500	10,100	31,000	61,000	117,000	27,400	12,800	7,800
23	6,000	6,600	7,600	7,400	49,200	10,100	33,400	60,000	114,000	26,000	12,600	7,500
24	6,400	6,600	7,800	7,400	123,000	10,200	34,000	62,500	111,000	25,300	14,300	7,200
25	5,900	6,500	7,800	7,600	165,000	12,200	30,200	66,200	108,000	26,000	15,600	7,800
26	5,400	6,400	7,700	8,100	99,900	11,300	27,300	68,300	98,500	23,700	18,300	7,300
27	5,100	7,100	7,500	8,700	82,500	11,600	24,000	68,200	90,200	23,500	17,100	6,000
28	6,200	7,900	6,200	8,900	65,100	12,000	22,200	68,200	84,800	23,300	16,300	5,700
29	7,200	35,000	5,600	11,600	59,600	12,300	18,800	72,800	77,800	20,200	12,800	5,300
30	7,200	82,600	6,200	13,700	-------	19,200	18,300	78,200	73,800	19,300	13,900	5,700
31	7,200	-------	6,600	13,600	-------	19,700	-------	81,100	-------	19,600	13,000	-------

* See under "Extremes of discharge" in station description.

Monthly discharge of Colorado River at Yuma, Ariz., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	14,000	5,800	7,700	473,000
November	9,200	7,300	8,050	479,000
December	8,400	6,700	7,340	451,000
January	6,200	1,800	3,760	231,000
February	8,900	4,700	7,170	398,000
March	24,100	5,600	8,840	544,000
April	29,000	14,600	20,600	1,230,000
May	50,700	28,600	36,100	2,220,000
June	57,600	20,600	34,300	2,040,000
July	35,600	12,000	20,200	1,240,000
August	26,500	4,300	10,700	658,000
September	8,800	2,300	5,160	307,000
The year	57,600	1,800	14,200	10,300,000
1919–20				
October	7,300	3,700	5,290	326,000
November	82,600	5,800	10,200	607,000
December	46,100	5,600	15,400	947,000
January	32,500	6,800	11,400	701,000
February	165,000	9,000	38,000	2,190,000
March	53,700	10,100	18,100	1,110,000
April	34,000	12,900	20,400	1,210,000
May	81,100	15,800	46,200	2,840,000
June	190,000	73,800	129,000	7,680,000
July	73,000	19,300	43,100	2,650,000
August	22,200	12,600	17,600	1,090,000
September	13,300	5,300	8,430	502,000
The year	190,000	3,700	30,100	21,900,000

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FRASER RIVER NEAR ARROW, COLO.

LOCATION.—In NE. ¼ sec. 4, T. 2 S., R. 75 W., a quarter of a mile from Vasquez siding on Denver & Salt Lake Railroad, in Arapahoe National Forest, and 1½ miles southwest of Arrow, Grand County. Nearest tributary enters half a mile above.

DRAINAGE AREA.—29 square miles (revised; measured on special map).

RECORDS AVAILABLE.—September 23, 1910, to September 30, 1920.

GAGE.—Friez water-stage recorder on left bank 300 feet upstream from old logging road crossing at Vasquez; inspected by employee of United States Forest Service. Prior to June 3, 1916, and from December 12, 1916, to May 26, 1917, vertical staff attached to downstream side of bridge on road to Arrow and a quarter of a mile above railroad bridge, was used. During winter, readings taken from staff gage 1 mile upstream at railroad bridge.

DISCHARGE MEASUREMENTS.—Made from footbridge near gage or by wading

CHANNEL AND CONTROL.—Bed composed of boulders and coarse gravel; shifting during high water. No well-defined control. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder; 1.4 feet at 2 p. m. May 28 (discharge, 168 second-feet); minimum discharge, 6.0 second-feet March 3–22.

Maximum stage during year ending September 30, 1920, from water-stage recorder, 1.9 feet at 6 p. m. June 10 (discharge, 322 second-feet); minimum discharge, 6.0 second-feet March 3, 6–13, 15, 16, 18–20, 23–30, and April 3–6.

1911–1920: Maximum discharge recorded, 820 second-feet at 9 p. m. June 13, 1918 (gage height, 2.9 feet); minimum discharge, 2 second-feet March 30, 1912 (gage height, 0.60 foot).

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Court decrees for diversion of 53 second-feet across divide from headwaters of Fraser River into headwaters of Clear Creek. During 1919, 476 acre-feet were diverted between June 15 and August 16; no diversion during 1920. Below station, court decrees for 74 second-feet for irrigation and 61 second-feet for placer and power.

REGULATION.—Diurnal fluctuation during spring is caused by alternate melting and freezing of mountain snow. No artificial regulation.

ACCURACY.—Stage-discharge relation for extremely low stages changed slightly during high water in 1919; slightly affected by ice during winter of 1919–20. Rating curves for recording gage, well defined; curve for winter gage well defined. Operation of water-stage recorder satisfactory October 1 to November 23, 1918, May 17 to November 1, 1919, and May 16 to September 30, 1920, except for short periods as noted in footnote to table of daily discharge; winter staff gage read once daily during intervening periods. Daily discharge ascertained by applying to rating table daily staff gage reading or daily mean gage height obtained by inspecting recorder graph except as indicated in footnote to table of daily discharge. Records excellent except for periods of ice effect and of missing gage-height record, for which they are fair.

COOPERATION.—Gage-height record furnished by United States Forest Service.

97418—25†—WSP 509——3

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Discharge measurements of Fraser River near Arrow, Colo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1918		*Feet*	*Sec.-ft.*	1919		*Feet*	*Sec.-ft.*
Oct. 11	P. V. Hodges	0.55	24.0	Oct. 13[a]	P. V. Hodges	0.67	12.3
11[a]	do	.85	20.1	Dec. 17[a]	do	.52	8.7
1919				17[a]	do	.52	9.0
Jan. 19[a]	do	.50	9.6	17[a]	do	.53	9.1
Feb. 13[a]	T. J. Watkins	.42	6.7	1920			
July 9	J. B. Spiegel	.80	54	Feb. 29[a]	do	.45	7.4
9[a]	do	1.30	64	June 7[a]	do	2.40	308
Oct. 13	P. V. Hodges	.42	16.6	7	do	1.80	301
				8	do	[b]1.61	240

[a] Measurement made at winter station.
[b] Gage at winter station read 2.25 feet.

Daily discharge, in second-feet, of Fraser River near Arrow, Colo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	21	38	12	8.3	7.8	6.2	8.0	33	109	73	60	22
2	21	35	12	8.3	7.8	6.2	11	33	100	81	55	24
3	21	28	12	8.3	7.8	6.0	8.6	42	100	80	50	23
4	21	26	12	8.3	7.8	6.0	9.5	52	86	75	48	21
5	21	26	11	8.3	7.4	6.0	12	52	78	67	46	21
6	22	24	11	8.3	7.0	6.0	9.5	62	75	67	44	21
7	23	20	11	8.0	7.0	6.0	13	52	78	63	43	19
8	24	20	11	8.0	7.0	6.0	9.5	52	83	59	43	19
9	25	22	10	8.0	7.0	6.0	8.6	42	84	55	43	21
10	26	24	9.8	7.8	6.8	6.0	8.0	42	94	54	40	17
11	26	24	10	7.8	6.8	6.0	9.5	52	103	52	37	18
12	25	24	9.8	7.8	6.4	6.0	11	52	107	54	35	24
13	25	24	9.5	7.8	6.4	6.0	12	62	112	55	32	28
14	25	24	9.5	7.8	6.4	6.0	12	57	118	50	30	26
15	25	24	9.5	7.8	6.4	6.0	10	62	118	48	30	32
16	28	22	9.5	7.8	6.2	6.0	10	78	116	48	31	31
17	28	20	9.2	7.6	6.4	6.0	15	70	118	48	28	30
18	27	18	9.2	7.6	7.4	6.0	19	78	114	48	28	28
19	24	16	8.9	7.8	6.4	6.0	26	93	112	48	29	28
20	24	14	8.9	7.8	6.4	6.0	22	107	109	48	28	28
21	24	12	8.6	7.8	6.4	6.0	33	122	105	45	27	27
22	26	12	8.9	7.6	6.4	6.0	52	126	98	43	27	26
23	28	12	9.2	7.6	6.4	6.2	52	124	94	43	26	25
24	25	12	8.9	7.4	6.4	6.4	62	126	89	41	26	24
25	24	12	8.9	7.0	6.4	6.4	52	135	86	40	26	23
26	26	12	8.6	7.2	6.4	6.2	57	142	84	40	25	22
27	36	12	8.6	7.4	6.4	6.0	42	135	83	41	27	22
28	36	13	8.6	7.6	6.2	6.0	33	156	76	41	25	22
29	38	12	8.3	7.6	.....	8.0	33	135	78	42	24	22
30	37	12	8.3	7.6	.....	6.0	33	144	70	39	21	21
31	41	.....	8.3	7.8	.....	8.0	.....	131	.....	60	21	.....

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Daily discharge, in second-feet, of Fraser River near Arrow, Colo., for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919-20												
1	21	12	10	8	8	7	7	12	196	168	56	30
2	21	12	10	8	8	7	7	13	156	156	52	29
3	21	12	10	8	8	6	6	14	137	156	51	28
4	21	14	10	8	8	7	6	17	133	144	52	28
5	21	11	10	8	8	7	6	20	129	137	48	28
6	21	12	9	8	9	6	6	24	168	122	46	30
7	21	16	9	8	12	6	7	22	256	114	45	34
8	20	12	9	8	9	6	7	29	272	105	43	32
9	18	12	9	8	9	6	9	25	288	108	47	29
10	19	11	9	8	8	6	9	33	288	100	46	28
11	18	10	9	8	10	6	8	25	272	96	45	25
12	18	9	9	8	10	6	8	22	256	92	48	24
13	16	9	9	8	10	6	8	22	241	88	46	24
14	15	10	9	8	12	7	8	38	241	84	43	23
15	15	11	9	8	12	6	8	33	241	78	38	22
16	15	12	9	8	11	6	8	40	226	84	37	21
17	14	11	9	8	12	7	11	47	211	80	36	24
18	16	12	9	8	12	6	7	54	182	76	36	25
19	16	11	8	8	11	6	7	61	168	72	41	24
20	18	11	8	8	11	6	7	81	156	70	48	24
21	21	11	8	8	10	8	7	101	168	68	56	25
22	18	12	8	8	8	7	7	121	168	64	54	24
23	16	14	8	8	7	6	7	128	168	72	51	24
24	15	14	8	8	7	6	7	135	182	72	50	24
25	15	13	8	8	8	6	7	142	168	81	47	25
26	16	13	8	8	8	6	7	129	168	75	45	24
27	14	11	8	8	7	6	7	135	182	67	42	24
28	12	10	8	8	7	6	7	135	182	61	41	23
29	12	10	8	7	7	6	7	168	168	58	37	22
30	12	11	8	8	-------	6	8	196	168	55	36	22
31	12	-------	8	8	-------	7	-------	226	-------	54	32	-------

NOTE.—Recorder not in operation Nov. 6-23, 1918; July 3-4, 7-8, 12, 16-19, 23-28, 30, 31, Aug. 1, 3-8, Sept. 21-26, 28-30, Oct. 1-3, 26-31, Nov. 1, 1919; May 16-24, July 11-16, 1920; discharge estimated or interplated on basis of comparison with flow of Colorado River at Hot Sulphur Springs and study of precipitation records. Staff gage not read Nov. 3, 10, 11, Dec. 10, 16, 1919; Feb. 22 and May 5, 1920; discharge interpolated. Discharge estimated because of ice Oct. 27, Nov. 2, 12-14, 27-29, 1919, and Feb. 4, 1920.

Monthly discharge of Fraser River near Arrow, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	41	21	26.3	1,620
November	38	12	19.9	1,180
December	12	8.3	9.71	597
January	8.3	7.0	7.80	480
February	7.8	6.2	6.77	376
March	8.0	6.0	6.18	380
April	62	8.0	23.1	1,370
May	156	33	85.5	5,260
June	118	70	95.9	5,710
July	81	40	53.5	3,290
August	60	21	34.0	2,090
September	36	17	24.2	1,440
The year	156	6.0	32.8	23,800
1919-20				
October	21	12	17.0	1,050
November	18	9	11.8	702
December	10	8	8.7	535
January	8	7	8.0	492
February	12	7	9.2	529
March	8	6	6.3	387
April	11	6	7.4	440
May	226	12	72.5	4,460
June	288	129	198	11,800
July	168	54	92.0	5,660
August	56	32	45.0	2,770
September	34	21	25.6	1,5[illegible]
The year	288	6	41.8	3[illegible]

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WILLIAMS FORK NEAR PARSHALL, COLO.

LOCATION.—About sec. 36, T. 1 N., R. 79 W., at private bridge at Field's ranch, 4 miles above mouth of river and 4 miles south of Parshall, Grand County. Nearest tributary, Battle Creek, enters from west 2 miles below station.

DRAINAGE AREA.—185 square miles (measured on Forest Service atlas).

RECORDS AVAILABLE.—July 25, 1904, to September 30, 1920.

GAGE.—Bristol float-type water-stage recorder at left end of bridge, installed October 18, 1919, and referred to previously used vertical staff on downstream side of bridge pier; inspected by F. A. Field.

DISCHARGE MEASUREMENTS.—Made from two-span bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of coarse gravel and small boulders; shifts. Control is gravel bar 50 feet downstream; slightly shifting. Water flows through small overflow channels at and above stage of 4.1 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 4.4 feet at 8.30 a. m. May 29 (discharge, 830 second-feet); minimum discharge, estimated 28 second-feet January 1 and 2 (stage-discharge relation affected by ice).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 4.75 feet at 6 a. m. June 9 (discharge, 1,320 second-feet); minimum stage, from water-stage recorder, 2.1 feet November 7 (discharge, 15 second-feet).

1904–1920: Maximum stage recorded, 6.0 feet at 9.45 a. m. June 14, 1918 (discharge, 2,520 second-feet); gage destroyed on June 15, 1918, when stage was probably higher; minimum discharge occurred in 1920.

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Court decrees for diversion of 1,416 second-feet from Williams Fork, all above station. Of this amount 700 second-feet is to be diverted to the eastern slope, but this diversion has not been made.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow.

ACCURACY.—Stage-discharge relation shifted slightly during October and November, 1918; affected by ice during periods November, 1918, to February, 1919, and November, 1919, to March, 1920. Standard rating curve well defined; shifting-channel method used October 1 to November 20, 1918. Operation of water-stage recorder satisfactory October 18–30, 1919, and April 13 to September 30, 1920. Staff gage read to hundredths twice daily during remaining periods. Daily discharge ascertained by applying mean daily gage height to rating table except for period for which shifting-channel method was used, and periods of ice effect and missing gage-height record for which it was ascertained as indicated and in footnote to table of daily discharge. Records excellent except for period of missing gage height and for periods of ice effect for which they are fair.

Discharge measurements of Williams Fork near Parshall, Colo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
1918				1919			
Oct. 12	P. V. Hodges	2.86	95	Oct. 18	P. V. Hodges	2.70	70
1919				1920			
Jan. 17	do	* 3.15	54	Jan. 2	T. J. Watkins	* 3.55	45.3
Feb. 12	T. J. Watkins	2.53	43.0	Feb. 29	P. V. Hodges	* 2.56	40.0
July 8	J. B. Spiegel	3.30	193	July 18	do	3.42	263

* Stage-discharge relation affected by ice.

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Daily discharge, in second-feet, of Williams Fork near Parshall, Colo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	106	86	60	28	47	69	68	160	555	234	135	58
2	110	90	60	28	44	71	68	176	555	231	170	56
3	110	88	60	40	40	40	68	176	432	375	190	60
4	98	94	60	40	40	38	64	170	375	300	162	56
5	96	98	60	40	41	66	74	162	326	228	135	40
6	94	92	60	40	47	69	75	225	284	228	114	50
7	90	94	60	40	40	68	50	201	274	219	106	47
8	86	92	58	38	43	77	46	201	284	219	110	46
9	88	88	57	40	41	77	38	207	284	192	110	79
10	94	88	54	40	41	75	46	210	304	184	110	64
11	96	88	50	50	40	68	54	207	375	160	104	69
12	85	88	47	54	43	85	48	210	432	154	100	72
13	96	86	47	47	38	79	51	198	492	198	92	92
14	90	86	46	43	34	66	58	198	492	165	88	176
15	92	86	46	43	33	83	50	247	506	162	82	110
16	88	82	48	47	32	44	47	274	457	137	80	108
17	86	79	54	54	30	54	66	313	464	131	75	97
18	86	75	62	54	33	51	92	355	438	129	82	85
19	85	70	66	54	40	48	124	420	432	160	80	80
20	85	68	60	51	46	50	133	506	432	131	75	87
21	88	64	54	54	44	44	129	598	426	99	72	80
22	88	62	46	54	46	51	184	630	414	92	75	75
23	86	54	40	54	47	54	213	555	420	88	71	64
24	88	46	38	54	48	51	264	590	414	92	69	64
25	92	47	34	54	54	53	278	630	414	92	71	64
26	90	50	34	54	54	48	267	590	375	95	71	64
27	90	54	35	54	57	56	241	630	295	116	66	64
28	85	54	40	54	68	51	210	670	288	87	106	64
29	86	58	40	51	------	60	198	750	250	90	74	64
30	85	60	40	48	------	62	192	670	250	154	62	64
31	81	------	34	47	------	66	------	590	------	135	66	------
1919–1920												
1	65	44	28	48	51	40	46	95	1,140	740	199	105
2	65	23	30	45	58	40	46	122	1,040	700	216	105
3	65	26	33	38	58	39	45	158	1,000	660	216	96
4	65	26	34	35	68	38	44	173	955	628	199	96
5	66	26	34	33	60	38	45	185	955	596	188	93
6	66	26	30	30	39	38	49	179	955	572	164	98
7	66	18	28	30	35	41	55	202	1,040	516	145	109
8	66	30	28	29	47	44	60	220	1,140	444	140	115
9	67	51	25	29	48	51	70	310	1,220	424	148	115
10	67	57	26	30	52	51	75	382	1,140	400	161	111
11	67	66	28	32	45	47	76	358	1,140	400	152	105
12	67	66	30	34	42	51	75	290	1,090	382	167	100
13	67	47	33	36	51	58	74	310	1,140	340	199	96
14	68	79	35	38	64	47	74	376	1,090	310	161	91
15	70	64	38	40	47	60	84	358	1,090	285	130	91
16	70	66	38	42	60	64	79	364	1,040	310	132	91
17	72	51	40	42	52	60	66	412	955	334	132	89
18	74	55	40	42	42	55	77	498	955	275	122	96
19	74	61	40	40	43	58	66	532	865	285	117	105
20	63	68	40	39	40	44	66	604	820	248	132	89
21	63	64	40	38	55	55	58	660	820	228	185	88
22	68	47	40	39	42	66	58	740	865	202	161	95
23	68	47	40	41	44	52	55	700	865	210	135	96
24	66	58	40	45	43	54	57	740	820	260	124	98
25	77	54	40	54	48	52	58	865	865	285	117	107
26	77	51	40	60	42	68	58	955	865	358	117	102
27	71	39	46	45	41	52	58	780	865	260	122	96
28	48	32	48	44	40	77	63	820	910	228	135	96
29	74	30	54	50	40	45	64	955	865	213	122	95
30	56	30	57	52	------	57	71	1,040	820	196	113	95
31	66	------	54	58	------	47	------	1,090	------	216	111	------

NOTE.—Stage-discharge relation affected by ice Nov. 9–11, 16–18, 21–30, Dec. 1–17, 21–31, 1918; Jan. 1–19, 23–28, 25–31, Feb. 1–3, 13–19, 21–27, Nov. 28 to Dec. 31, 1919; Jan. 1–17, 19–24, Feb. 24 to Mar. 7, 1920; discharge ascertained by means of three discharge measurements, temperature and gage-height records, and observer's notes. No gage-height record Sept. 24 to Oct. 17, 1919, and Apr. 1–12, 1920; discharge ascertained by comparison with flow of Colorado River at Hot Sulphur Springs.

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Monthly discharge of Williams Fork near Parshall, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	110	81	91.0	5,600
November	98	46	75.6	4,500
December	66	34	50.0	3,070
January	54	28	46.7	2,870
February	68	30	43.2	2,400
March	85	38	60.5	3,720
April	278	38	117	6,960
May	750	160	378	23,200
June	555	250	391	23,300
July	375	87	164	10,100
August	190	62	96.9	5,960
September	176	46	73.9	4,400
The year	750	28	133	96,100
1919-20				
October	77	48	67.3	4,140
November	79	18	46.7	2,780
December	57	26	37.3	2,290
January	60	29	40.6	2,500
February	68	35	48.0	2,760
March	77	38	51.3	3,150
April	84	44	62.4	3,710
May	1,090	96	490	30,700
June	1,220	820	978	58,200
July	740	196	371	22,800
August	216	111	150	9,220
September	115	88	98.8	5,880
The year	1,220	18	204	148,000

BLUE RIVER AT DILLON, COLO.

LOCATION.—In sec. 18, T. 5 S., R. 77 W., at highway bridge on edge of Dillon, Summit County. Nearest tributaries, Snake River and Tenmile Creek, enter a short distance below.

DRAINAGE AREA.—110 square miles (measured on Forest Service atlas).

RECORDS AVAILABLE.—October 15, 1910, to September 30, 1920.

GAGE.—Gurley water-stage recorder, installed April 21, 1920, and referred to previously used vertical staff on right abutment of bridge; inspected by employee of United States Forest Service.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of compact gravel upon which lodges detritus from hydraulic dredges near Breckenridge. Control is riffle 50 feet downstream; shifts at intervals. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 3.0 feet at 7 a. m. May 27, 28, 29, and 30 (discharge, 510 second-feet); minimum discharge, estimated 17 second-feet February 21 to March 9 (stage-discharge relation affected by ice).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 3.7 feet at 4 a. m. June 1 (discharge, 850 second-feet); minimum discharge occurred during winter when observations were discontinued.

1911-1920: Maximum stage recorded, 4.35 feet June 2, 1914 (discharge, 1,180 second-feet); minimum discharge, 14 second-feet on January 30 and February 9, 1915 (gage height, 1.10 feet).

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Court decrees for diversion of 2.3 second-feet for irrigation from Blue River above station and 63 second-feet below; also placer decrees for diversion of 118 second-feet near Breckenridge. Small unadjudicated diversion from headwaters of Blue River across Boreas Pass to Tarryall Creek.

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Regulation.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow. No artificial regulation.

Accuracy.—Stage-discharge relation changed slightly during June, 1919, and again during period of no record, October, 1919, to April, 1920; affected by ice December 1, 1918, to April 9, 1919. Two well defined rating curves used; one from October 1, 1918, to June 12, 1919, and from May 1 to September 30, 1920, and the other from June 13 to September 30, 1919; shifting-channel method used June 5–12, 1919. Staff gage read to hundredths twice daily during 1919; operation of water-stage recorder satisfactory during period of record in 1920. Daily discharge ascertained by applying mean daily gage height to rating table except for period for which shifting-channel method was used and periods indicated in footnote to tables of daily discharge. Records excellent except for spring of 1919 when diurnal fluctuation occurred, and for periods of ice effect, for which they are fair.

Cooperation.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Blue River at Dillon, Colo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
1918				1919			
Oct. 16	Robert Follansbee	1.50	49.0	May 27	J. B. Spiegel	2.90	470
				June 20	Robert Follansbee	2.68	325
1919				1920			
Jan. 15	P. V. Hodges	* 1.25	28.5	Apr. 20	P. V. Hodges	* 1.22	27.8
Feb. 19	T. J. Watkins	* 1.30	18.4	June 19	Robert Follansbee	2.75	393

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Blue River at Dillon, Colo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	60	47	46	32	23	17	27	117	355	265	134	42
2	60	49	44	32	23	17	26	119	315	305	131	44
3	60	49	43	32	24	17	26	110	295	458	146	44
4	60	49	42	31	24	17	23	104	255	285	128	44
5	60	47	41	31	24	17	29	104	236	245	106	44
6	55	47	41	30	24	17	31	123	217	225	96	44
7	55	47	40	30	23	17	32	130	200	245	86	44
8	55	47	40	29	22	17	32	130	236	225	84	44
9	55	47	38	29	22	17	33	130	236	208	83	42
10	55	47	37	28	21	18	34	130	236	167	76	40
11	55	47	37	28	21	18	34	130	295	161	73	46
12	55	47	36	28	20	18	34	130	295	173	70	50
13	55	47	36	28	20	19	38	150	305	161	69	60
14	55	47	36	28	20	19	36	170	325	161	66	98
15	52	47	36	28	20	20	36	217	390	164	65	106
16	50	47	35	28	20	20	40	236	345	152	58	90
17	50	47	35	28	19	20	40	295	345	131	58	73
18	50	47	34	28	19	20	55	335	368	126	54	70
19	50	47	34	27	18	21	66	375	325	158	56	70
20	50	47	34	28	18	21	78	420	325	161	58	68
21	50	47	33	28	17	21	98	465	326	126	54	58
22	50	47	33	28	17	21	112	488	305	104	50	58
23	50	47	32	28	17	21	135	488	235	104	48	56
24	50	47	31	27	17	21	155	442	285	96	48	52
25	50	47	31	26	17	22	184	465	285	94	48	48
26	50	47	31	26	17	23	150	442	265	88	50	48
27	50	47	31	26	17	24	142	488	265	92	44	48
28	49	47	32	25	17	24	130	488	265	86	48	48
29	49	47	32	23	-------	24	115	510	245	86	48	48
30	47	47	32	23	-------	24	108	510	265	114	46	46
31	46	-------	32	23	-------	26	-------	442	-------	140	46	-------

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Daily discharge, in second-feet, of Blue River at Dillon, Colo., for the years ending Sept. 30, 1919 and 1920—Continued.

Day	Apr.	May	June	July	Aug.	Sept.	Day	Apr.	May	June	July	Aug.	Sept.
1920							1920						
1	------	43	700	375	194	81	16	------	135	532	184	98	69
2	------	50	600	375	207	75	17	------	155	488	187	97	66
3	------	65	578	375	184	73	18	------	217	465	181	91	65
4	------	75	555	365	172	72	19	------	295	420	175	89	65
5	------	89	555	355	187	76	20	28	325	375	167	102	58
6	------	121	555	315	181	75	21	------	370	375	161	119	60
7	------	130	600	275	158	78	22	------	442	398	155	140	61
8	------	155	650	255	135	81	23	------	375	420	184	130	63
9	------	217	700	236	126	79	24	------	442	420	210	112	63
10	------	228	650	236	128	79	25	------	510	420	295	102	63
11	------	187	600	236	132	76	26	------	555	398	375	95	61
12	------	155	532	217	126	76	27	------	442	410	295	108	59
13	------	142	555	204	128	75	28	------	465	420	236	121	58
14	------	142	555	200	121	73	29	------	532	420	217	110	57
15	------	150	555	197	106	72	30	------	625	398	191	97	56
							31	------	675	------	178	87	------

NOTE.—Observation discontinued Oct. 1, 1919, to Apr. 30, 1920. Stage-discharge relation affected by ice Dec. 1, 1918, to Apr. 9, 1919; discharge ascertained by means of two discharge measurements, gage height and weather records, and observer's notes. Water-stage recorder not operating May 20, 21, June 6–11, 27, July 4, 18, 1920; discharge ascertained by comparison with flow of Williams Fork near Parshall.

Monthly discharge of Blue River at Dillon, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	60	46	52.8	3,260
November	49	47	47.2	2,810
December	46	31	36.0	2,210
January	32	23	27.9	1,720
February	24	17	20.0	1,110
March	26	17	19.9	1,220
April	184	27	69.6	4,140
May	510	104	287	17,660
June	390	200	290	17,260
July	458	86	171	10,660
August	146	44	71.8	4,410
September	106	40	55.6	3,330
The year	510	17	96.1	69,600
1920				
May	675	43	274	16,800
June	700	375	510	30,300
July	375	155	245	15,100
August	207	87	128	7,870
September	81	56	68.9	4,100
The period	------	------	------	74,260

SNAKE RIVER AT DILLON, COLO.

LOCATION.—In sec. 18, T. 5 S., R. 77 W., at highway bridge 100 yards above mouth of river, at Dillon, Summit County. Nearest tributary, a small stream, enters from north 1 mile above station.

DRAINAGE AREA.—92 square miles (measured on Forest Service atlas).

RECORDS AVAILABLE.—October 15, 1910, to September 30, 1919, when station was discontinued.

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GAGE.—Vertical staff on downstream side of right bridge abutment; read by M. D. Pierce. Prior to April 26, 1913, gage was 2 feet farther upstream, and although referred to same datum, water piled up on gage during high water, giving a higher reading for same discharge.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of small boulders; rough but permanent. Control 50 feet downstream; shifted during 1919. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.0 feet at 6 p. m. May 28 (discharge, 425 second-feet); minimum discharge, 11 second-feet February 5.

1911–1919: Maximum stage recorded, 3.1 feet at 7 a. m. and 7 p. m. June 15, 1918 (discharge, 1,170 second-feet); minimum discharge, 3 second-feet November 9, 1912.

ICE.—Stage-discharge relation seriously affected by ice.

DIVERSIONS.—Snake River ditch of Summit County Power Co. diverts about 30 second-feet from Snake River above Dillon. Irrigation decree for 4.5 second-feet above Dillon.

REGULATION.—Operation of power canal affects low-water flow.

ACCURACY.—Stage-discharge relation shifting; slightly affected by ice on January 25 and 28. Standard rating curve fairly well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for periods February 1 to March 25 and June 1 to August 20 for which it was ascertained by shifting-control method, and except for January 25 and 28, when stage-discharge relation was affected by ice, for which it was interpolated. Records good.

Discharge measurements of Snake River at Dillon, Colo., during the year ending September 30, 1919

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 16	Robert Follansbee	0.44	16.4	Feb. 19	T. J. Watkins	0.26	12.1
Jan. 14	P. V. Hodges	.40	12.4	May 27	J. B. Spiegel	1.68	272
15	do	[a] .72	12.2	June 20	Robert Follansbee	1.35	142

[a] Stage-discharge relation affected by ice.

Discharge measurements of Snake River ditch at Dillon, Colo., during the year ending September 30, 1919

Date	Made by—	Gage height	Discharge
			Sec.-ft.
Jan. 15	P. V. Hodges		8.8
Feb. 19	T. J. Watkins		3.6

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Daily discharge, in second-feet, of Snake River at Dillon, Colo., for the year ending September 30, 1919

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	26	24	17	14	12	12	37	26	168	110	158	16
2	26	25	16	14	12	12	34	26	169	126	168	19
3	26	24	16	14	12	12	28	22	130	137	137	18
4	26	22	15	14	12	12	34	20	108	102	93	15
5	26	20	15	14	11	12	43	20	96	93	72	14
6	22	18	14	14	12	12	31	28	96	83	69	14
7	22	18	14	14	12	12	20	35	108	102	60	14
8	22	18	14	14	12	12	18	35	126	83	62	14
9	22	18	14	14	12	12	17	35	135	71	61	15
10	22	18	14	14	12	12	15	29	130	67	71	15
11	22	18	14	14	12	12	14	26	128	66	72	16
12	22	18	14	14	12	12	14	36	150	71	66	17
13	22	18	14	13	16	12	22	43	165	72	60	25
14	22	18	14	14	12	12	21	55	175	74	56	78
15	20	18	14	14	12	12	18	91	175	61	51	56
16	16	18	14	14	13	12	18	78	172	60	39	39
17	16	18	14	14	13	12	22	96	165	55	39	36
18	16	18	14	13	13	12	55	113	152	67	34	23
19	16	18	14	13	12	12	47	184	148	83	31	25
20	16	18	14	13	12	13	49	233	141	69	30	22
21	16	18	14	13	12	13	51	233	148	58	28	19
22	16	18	14	13	12	14	49	284	148	48	22	18
23	16	18	14	12	12	13	76	252	124	40	20	15
24	16	18	14	12	12	12	66	268	126	42	20	14
25	16	18	14	14	13	13	55	264	113	38	20	14
26	16	18	14	14	12	13	47	302	110	35	20	14
27	17	18	14	12	12	14	47	307	113	40	25	14
28	18	18	14	14	12	14	38	375	104	38	26	14
29	18	18	14	14	-------	14	37	312	104	48	20	14
30	20	18	14	13	-------	16	31	272	106	89	18	13
31	22	-------	14	13	-------	22	-------	216	-------	102	18	-------

Monthly discharge of Snake River at Dillon, Colo., for the year ending September 30, 1919

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	26	16	20.0	1,230
November	25	18	18.8	1,120
December	17	14	14.3	879
January	14	12	13.5	830
February	16	11	12.2	678
March	22	12	12.9	793
April	76	14	35.1	2,090
May	375	20	139	8,550
June	175	96	134	7,970
July	137	35	71.9	4,420
August	168	18	53.7	3,300
September	78	13	21.3	1,270
The year	375	11	45.8	33,100

TENMILE CREEK AT DILLON, COLO.

LOCATION.—In sec. 18, T. 5 S., R. 77 W., at highway bridge 300 yards above mouth of creek, in Dillon, Summit County. Nearest tributary, Canyon Creek, enters from west 4 miles above.

DRAINAGE AREA.—113 square miles (measured on Forest Service atlas).

RECORDS AVAILABLE.—October 15, 1910, to September 30, 1919, when station was discontinued.

GAGE.—Vertical staff on downstream side of center pier; read by M. D. Pierce. Prior to June 10, 1914, gage was on side of pier, and although referred to same datum, water piled up on gage during high water, giving a higher reading for same discharge.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of small boulders; rough but permanent. Control 50 feet downstream; shifted slightly during 1919. Banks high and not subject to overflow.

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EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.4 feet at 6 p. m. May 21 and 22 (discharge, 897 second-feet); minimum discharge occurred during winter.

1911–1919: Maximum stage recorded, 4.25 feet at 6 p. m. June 16, 1917 (discharge, 1,630 second-feet); minimum discharge, 2 second-feet February 15–17 and 20, 1918.

ICE.—Stage-discharge relation seriously affected by ice.

DIVERSIONS.—Court decrees for diversion of 11 second-feet from Tenmile Creek above station.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow.

ACCURACY.—Stage-discharge relation slightly shifting; affected by ice. Standard rating curve well defined. Gage read to hundredths twice daily. Daily discharge ascertained by shifting-control method except as indicated in footnote to table of daily discharge. Records good except for periods of ice effect and during spring when there was diurnal fluctuation, for which they are fair.

Discharge measurements of Tenmile Creek at Dillon, Colo., during the year ending Sept. 30, 1919

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 16	Robert Follansbee	1.76	45.5	May 27	J. B. Spiegel	3.01	597
Jan. 14	P. V. Hodges	* 2.82	23.1	June 20	Robert Follansbee	2.51	271

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Tenmile Creek at Dillon, Colo., for the year ending Sept. 30, 1919

Day	Oct.	Nov.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	64	48			22	35	162	348	212	141	45
2	64	45			23	42	159	330	245	144	55
3	64	45			23	50	148	275	324	155	55
4	64	45			24	45	127	245	212	127	52
5	64	45			24	59	138	225	203	103	49
6	50	45			24	58	166	221	181	91	45
7	50	45			24	43	190	240	212	91	43
8	50	45			24	42	190	270	185	89	45
9	50	45			24	42	194	260	174	89	49
10	50	45			24	40	185	270	162	85	49
11	50	45			24	41	174	324	174	83	49
12	50	45			24	41	185	324	181	73	52
13	50	45			25	52	194	342	185	68	66
14	50	45	23		24	43	225	324	177	70	127
15	48	45			24	40	366	372	166	79	101
16	45	40			24	44	396	314	159	79	73
17	45	38			24	48	448	319	159	79	64
18	45	36			25	62	518	314	148	55	62
19	45	35			25	83	625	302	159	52	55
20	45	34		24	25	113	700	292	130	58	55
21	45	31		24	25	170	738	275	110	55	55
22	45	27		24	25	190	700	255	110	55	55
23	45	25		24	25	297	662	245	113	54	54
24	45	24		24	25	302	700	245	113	49	54
25	45	25			25	314	662	230	101	49	49
26	45	25			26	235	625	221	85	49	45
27	48	26			26	203	662	216	89	49	43
28	48	27			27	170	662	212	98	55	43
29	48	28			27	162	625	190	89	55	43
30	49	28			27	162	518	199	159	52	43
31	50				27		410		181	52	

NOTE.—Stage-discharge relation affected by ice Nov. 16 to Feb. 19, Feb. 25 to Mar. 4, 12, and Apr. 2; discharge ascertained by means of one discharge measurement, gage-height and temperature records, and observer's notes, as follows: Nov. 16–30, as given in table; December, 26 second-feet; January, 23 second-feet; Feb. 20–24, as given in table (mean for month of February, 23 second-feet); Mar. 1–4, 12; and Apr. as given in table.

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Monthly discharge of Tenmile Creek at Dillon, Colo., for the year ending Sept. 30, 1919

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	64	45	50.2	3,090
November	48	24	37.6	2,240
December	----------	----------	25.0	1,540
January	----------	----------	23.0	1,410
February	----------	----------	23.0	1,280
March	27	22	24.7	1,520
April	314	35	108	6,430
May	738	127	402	24,700
June	372	190	273	16,200
July	324	85	161	9,900
August	155	49	76.9	4,730
September	127	43	55.8	3,320
The year	738	----------	106	76,400

NOTE.—See footnote to table of daily discharge.

EAGLE RIVER AT REDCLIFF, COLO.

LOCATION.—In sec. 29, T. 6 S., R. 80 W., at footbridge in Redcliff, Eagle County. Nearest tributary, Turkey Creek, enters 100 yards below station; Homestake Creek enters 1 mile below.

DRAINAGE AREA.—74 square miles (measured on topographic map).

RECORDS AVAILABLE.—January 8, 1911, to September 30, 1920.

GAGE.—Chain on downstream side of footbridge; read by employee of United States Forest Service. Staff gage in same section and referred to same datum, read during high water.

DISCHARGE MEASUREMENTS.—Made from highway bridge 800 feet above station or by wading.

CHANNEL AND CONTROL.—Bed composed of boulders; very rough. Control short distance below gage; shifts between narrow limits. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 2.65 feet from 8 p. m. May 20 to 7 a. m. May 22 (discharge, 380 second-feet); minimum stage recorded, 0.25 foot at 9.30 a. m. November 23 (discharge, 5 second-feet).

Maximum stage recorded during year ending September 30, 1920, 3.5 feet at 8 a. m. June 1 (discharge, 685 second-feet); minimum stage recorded, 0.33 foot at 7 a. m. October 21 (discharge, 3 second-feet).

1911–1920: Maximum stage recorded, 4.0 feet June 5, 1912 (discharge, 1,010 second-feet); minimum stage, 0.01 foot at 7 a. m. October 15, 1917 (discharge, 1 second-foot).

ICE.—Stage-discharge relation not affected by ice except for occasional short periods.

DIVERSIONS.—Court decrees for diversion of 6 second-feet from Eagle River above station, and also decrees for diversion to Arkansas River basin of 18.5 second-feet from Piney Creek, a tributary. During 1919, 1,830 acre-feet were diverted, and during 1920, 1,660 acre-feet were diverted under this decree.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow. Filling of Pando ice ponds in fall reduces flow for a few days.

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ACCURACY.—Stage-discharge relation slightly shifting; not affected by ice. Two well defined rating curves used; one from October 1 to November 30, 1918, and April 1 to September 30, 1920, and the other from December 1, 1918, to March 31, 1920. Indirect method for shifting control used April 1–30, 1920. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for period for which shifting-control was used and periods noted in footnote to table of daily discharge. Records good except for periods of missing gage heights, for which they are fair.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Eagle River at Redcliff, Colo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft.*	1920		*Feet*	*Sec.-ft.*
Jan. 3	T. J. Watkins	0.75	13.8	July 21	P. V. Hodges	1.24	54
May 25	J. B. Spiegel	2.48	325				
Oct. 30	T. J. Watkins	.60	7.7				

Daily discharge, in second-feet, of Eagle River at Redcliff, Colo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918-19												
1	25	24	16	11	13	-------	30	168	260	71	81	-------
2	25	24	16	12	13	-------	34	156	232	78	85	-------
3	26	23	15	13	13	-------	31	122	219	116	69	-------
4	26	22	15	14	13	-------	29	133	193	74	52	-------
5	25	24	14	14	13	-------	31	133	180	66	46	-------
6	24	22	15	14	13	-------	52	168	168	65	41	-------
7	24	22	16	14	13	-------	41	144	168	78	41	-------
8	24	22	15	13	13	-------	21	156	168	63	41	-------
9	24	22	14	14	13	-------	18	168	168	59	41	-------
10	26	20	15	14	13	-------	19	168	168	53	42	-------
11	25	19	13	13	13	-------	20	156	168	50	39	-------
12	24	21	12	14	13	-------	20	144	168	51	37	-------
13	24	21	11	14	13	-------	20	168	168	62	35	-------
14	22	21	12	11	-------	-------	28	193	156	73	34	-------
15	22	22	13	14	-------	-------	26	219	156	60	33	-------
16	23	19	12	14	-------	-------	25	246	144	53	30	-------
17	22	20	12	14	-------	-------	32	260	156	50	26	-------
18	24	20	12	14	-------	-------	60	288	156	48	26	-------
19	24	21	12	14	-------	-------	98	303	133	46	26	-------
20	25	21	11	14	-------	-------	106	364	133	41	27	-------
21	26	16	10	13	-------	-------	118	380	122	38	26	-------
22	26	6	9	13	-------	-------	133	364	118	36	24	-------
23	25	5	8	12	-------	-------	156	364	114	36	24	-------
24	26	8	8	12	-------	-------	156	348	106	29	22	-------
25	27	10	8	13	-------	-------	180	333	100	31	22	-------
26	26	10	7	13	-------	-------	149	364	92	29	22	-------
27	27	10	9	13	-------	-------	156	364	91	27	22	-------
28	28	13	11	13	-------	-------	122	333	85	32	22	17
29	27	16	14	13	-------	17	133	333	81	62	21	-------
30	20	16	12	13	-------	21	144	318	73	102	21	-------
31	22	-------	10	13	-------	28	-------	274	-------	83	21	-------

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Daily discharge, in second-feet, of Eagle River at Radcliff, Colo., for the years ending Sept. 30, 1919 and 1920—Continued.

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919–20												
1	17	4.6	14	10	11	7.6	10	37	617	131	62	30
2	17	7.6	14	10	10	8.8	12	47	481	136	61	30
3	18	9.6	13	10	11	8.4	12	58	464	121	55	30
4	19	11	12	12	9.6	9.2	11	76	447	133	53	30
5	19	22	14	12	10	9.2	12	102	431	133	53	30
6	19	19	14	10	9.6	9.6	12	136	415	127	50	30
7	19	16	14	13	11	8.0	15	151	431	114	49	30
8	22	16	14	14	11	9.6	16	199	464	108	38	30
9	20	16	12	12	9.6	10	20	225	447	100	31	30
10	20	16	14	13	8.8	11	19	238	415	92	31	30
11	21	17	14	12	10	10	21	238	367	92	31	30
12	20	15	14	13	7.8	10	15	252	337	84	31	30
13	20	18	14	12	7.6	12	19	199	308	72	35	30
14	21	16	15	12	9.6	11	24	199	308	68	30	30
15	21	11	14	12	10	7.4	24	186	294	68	30	30
16	19	18	14	12	11	11	26	186	280	70	30	30
17	18	16	14	10	10	11	23	238	266	70	30	30
18	18	16	14	12	10	12	19	308	252	67	30	30
19	9.2	17	12	11	10	12	17	352	238	64	30	29
20	7.6	15	11	12	9.6	10	19	415	238	58	31	29
31	3.2	15	14	10	9.2	12	19	481	212	58	35	28
22	4.4	17	14	9.2	9.2	13	19	515	212	59	31	28
23	9.2	32	13	10	9.6	13	19	515	199	62	30	27
24	11	10	13	11	9.2	8.4	19	481	199	78	30	25
25	9.2	5.6	13	11	9.6	12	19	549	186	114	30	22
26	17	11	13	11	8.0	12	15	583	174	151	30	21
27	20	5.6	13	10	9.6	23	20	464	174	88	31	21
28	24	12	12	9.6	10	15	20	481	174	62	30	20
29	12	10	12	10	9.2	13	22	549	174	59	30	20
30	8.4	13	12	11	-------	17	26	617	162	55	30	20
31	7.8	-------	12	10	-------	10	-------	617	-------	62	30	-------

NOTE.—Gage not read; discharge interpolated Oct. 6, 13, 20, 27, Nov. 3, 10, 17, 19, 24, 26, 28, 30, Dec. 1 8, 1918, Jan. 1, 5, 12, 19, 22, 23, 26, Feb. 1, 2, 4, 9, July 13, Aug. 26, Sept. 29, 30, 1919, and Aug. 29 to Sept. 11, 1920. Gage not read Dec. 12–29, 1918, Feb. 14 to Mar. 28, and Aug. 30 to Sept. 27, 1919; discharge estimated by means of weather records or comparison with flow of Fryingpan Creek at Thomasville, as follows: Dec. 12–29, 1918, as given in table; Feb. 14–28, 1919, 13 second-feet; March, 1919, 15 second-feet; Aug. 30, 31 1919, as given in table; September, 1919, 28 second-feet.

Monthly discharge of Eagle River at Redcliff, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	28	20	24.6	1,510
November	24	5	18.0	1,070
December	16	7	12.2	750
January	14	11	13.2	812
February	-------	-------	13.0	732
March	-------	-------	15.0	922
April	180	18	72.9	4,340
May	380	122	246	15,100
June	200	73	148	8,810
July	116	27	56.9	3,500
August	85	21	35.5	2,180
September	-------	-------	28.0	1,670
The year	380	-------	57.2	41,400

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Monthly discharge of Eagle River at Redcliff, Colo., for the years ending Sept. 30, 1919 and 1920—Continued

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919-20				
October	24	3.2	15.8	972
November	32	4.6	14.3	851
December	14	11	13.3	818
January	14	9.2	11.2	689
February	11	7.6	9.7	558
March	23	7.4	11.2	689
April	26	10	18.1	1,080
May	617	37	313	19,200
June	617	162	312	18,600
July	151	55	89.2	5,490
August	62	30	36.4	2,240
September	30	20	27.7	1,650
The year	617	3.2	72.8	52,800

NOTE.—See footnote to table of daily discharge.

EAGLE RIVER AT EAGLE, COLO.

LOCATION.—In sec. 33, T. 4 S., R. 84 W., 500 feet below highway bridge at Eagle, Eagle County. Nearest tributary, Brush Creek, enters three-quarters of a mile below station.

DRAINAGE AREA.—650 square miles (revised; measured on base map of Colorado, scale 1: 500,000).

RECORDS AVAILABLE.—January 17, 1911, to September 30, 1920. March 12, 1905, to February 10, 1907, station was maintained short distance below mouth of Brush Creek.

GAGE.—Stevens water-stage recorder installed April 5, 1919, and referred to same datum as chain gage, 500 feet upstream which has been used since January 17, 1911. The readings at the recorder were less than the chain gage owing to slope of the river, therefore an inclined gage was installed October 28, 1919, near recorder at same datum as chain gage. Datum of inclined gage and recorder lowered 1 foot November 21, 1919.

DISCHARGE MEASUREMENTS.—Made from private bridge half a mile downstream or by wading.

CHANNEL AND CONTROL.—Bed composed of boulders; shifting temporarily during 1919 and 1920. Control at rapids in which gage intake is located and shifts between narrow limits. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 4 feet at 8 a. m. May 27 (discharge, 3,500 second-feet); minimum discharge occurred during winter, when record was discontinued.

Maximum stage recorded during year ending September 30, 1920, 5.05 feet at 8 a. m. June 9 (discharge, 5,410 second-feet); minimum stage, 0.35 foot from 7 p. m. February 17 to 1 p. m. February 18 (discharge, 75 second-feet).

1911-1920: Maximum stage recorded, 6.3 feet at 6 a. m. June 3, 1914 (discharge, 6,760 second-feet); minimum stage occurred in 1920.

ICE.—Stage-discharge relation seriously affected by ice.

DIVERSIONS.—Between Eagle and Redcliff, court decrees for diversions of 80 second-feet from Eagle River. There are decrees for diversions of 22 second-feet from Eagle River below Eagle.

REGULATION.—Diurnal fluctuation during spring caused by alternate melting and freezing of mountain snow.

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ACCURACY.—Stage-discharge relation not permanent; affected by ice during winter. Rating curves used October 1 to November 20, 1918, April 5 to September 30, 1919, and October 11, 1919, to September 30, 1920, are well defined. Chain gage read to hundredths once daily October 1 to November 20, 1918. Operation of water-stage recorder during 1919 and 1920 not very satisfactory. Daily discharge ascertained by applyiing to rating tables one daily gage height, or daily mean gage height obtained from inspection of recorder graph, except periods October 1, 1918, to November 20, 1918, October 11, 1919, to November 29, 1919, and April 1, 1920, to August 15, 1920, when shifting-control method was used. Records good except for periods of missing gage heights and when affected by ice, for which they are fair.

Discharge measurements of Eagle River at Eagle, Colo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft.*	1920		*Feet*	*Sec.-ft.*
Feb. 9	T. J. Watkins[a]	[a]0.54	91	Jan. 4	T. J. Watkins	[a]1.33	98
Mar. 23	do	.35	218	Feb. 26	do	.55	105
Apr. 5	do	.54	265	May 8	Robert Follansbee	2.32	1,040
May 2	Robert Follansbee	.95	819	June 20	do	3.14	2,100
June 19	do	1.86	1,770	July 19	P. V. Hodges	2.26	836
Oct. 28	T. J. Watkins	—.21	167	Aug. 11	Robert Follansbee	1.65	501
Nov. 21	Robert Follansbee	[b].70	126				

[a] Stage-discharge relation affected by ice.
[b] Datum lowered 1 foot.
[c] Employee of U. S. Forest Service.

Daily discharge, in second-feet, of Eagle River at Eagle, Colo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	208	156					235	748	2,220	988	490	225
2	201	156					240	825	1,740	1,030	540	223
3	195	152					245	785	1,410	1,120	590	220
4	201	152					250	748	1,210	1,030	590	267
5	195	156					257	748	988	945	490	286
6	195	156					303	905	945	865	445	272
7	190	152					263	865	945	820	455	251
8	190	156					235	905	1,080	780	413	237
9	195	156					212	865	1,120	760	431	223
10	195	156					208	905	1,310	750	455	237
11	201	152					203	945	1,410	720	408	272
12	208	156					206	905	1,410	700	368	272
13	208	156					210	945	1,510	670	346	266
14	201	156					248	1,120	1,410	650	342	300
15	195	156					242	1,620	1,740	640	342	326
16	190	156					237	1,740	1,620	630	346	338
17	185	156					251	1,980	1,740	610	350	326
18	180	156					310	2,100	1,740	560	342	310
19	175	152					431	2,460	1,620	520	314	289
20	175	152					568	2,590	1,460	480	292	278
21	170						650	2,720	1,310	470	278	364
22	170						710	2,850	1,310	450	257	314
23	170						1,030	3,240	1,210	420	242	260
24	165						1,210	3,110	1,310	414	231	235
25	161						1,210	3,110	1,210	413	217	206
26	161						1,120	3,110	1,210	413	215	201
27	161						988	3,240	1,120	415	225	186
28	156						865	3,110	1,120	420	245	174
29	161						748	3,110	1,080	420	231	162
30	161						710	2,980	1,080	440	210	150
31	156							2,850		460	212	

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Daily discharge, in second-feet, of Eagle River at Eagle, Colo., for the years ending Sept. 30, 1919 and 1920—Continued.

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919-20												
1	145	157	108	108	108	98	135	294	5,000	2,300	701	325
2	145	157	108	107	106	104	112	361	4,460	2,400	687	320
3	150	158	108	101	104	123	121	405	4,370	2,200	715	315
4	150	160	108	96	102	104	108	480	4,190	2,000	785	310
5	160	162	108	96	100	101	116	624	4,100	1,770	799	305
6	170	165	108	95	100	101	128	764	4,200	1,700	673	300
7	180	140	108	88	95	98	173	908	4,470	1,600	597	294
8	190	114	108	85	92	93	264	1,070	4,740	1,500	545	288
9	200	107	108	85	95	92	272	1,280	4,920	1,400	503	282
10	205	100	108	91	108	92	264	1,510	4,110	1,280	485	276
11	208	105	110	98	99	93	230	1,450	3,840	1,200	497	268
12	208	110	110	102	97	101	190	1,220	3,750	1,100	463	265
13	208	105	110	106	86	101	214	1,170	3,840	1,080	452	261
14	208	115	112	110	88	114	230	1,220	3,670	1,050	410	257
15	208	126	114	114	97	110	243	1,020	3,750	1,000	385	253
16	208	126	112	116	93	102	243	948	3,330	950	375	250
17	208	126	112	116	85	95	214	989	3,080	900	361	247
18	208	126	110	118	93	95	184	1,590	2,840	866	346	243
19	200	126	110	114	114	100	170	1,850	2,360	836	386	240
20	190	126	108	106	114	106	179	2,410	2,040	785	428	233
21	187	126	106	100	114	140	182	2,890	2,250	778	474	236
22	184	128	110	98	110	179	152	2,970	2,490	743	497	236
23	181	130	110	95	100	147	157	2,810	2,650	868	420	238
24	178	125	109	95	100	132	162	3,460	2,650	844	370	246
25	175	115	109	98	102	147	160	3,210	2,810	1,200	337	253
26	172	100	109	102	105	142	154	4,550	2,650	1,370	319	243
27	169	95	109	106	102	128	157	3,650	2,650	1,020	342	233
28	168	109	109	108	96	119	165	3,650	2,650	844	361	230
29	168	110	109	110	96	116	179	4,190	2,600	820	350	230
30	168	108	108	112	-------	116	208	4,460	2,500	757	340	230
31	168	-------	108	110	-------	147	-------	4,460	-------	673	330	-------

NOTE.—Water-stage recorder out of order May 14-18 and May 24 to June 7, 1919. Discharge obtained from gage-height graph drawn by use of one daily gage height, temperature record, and knowledge of amount of diurnal fluctuation. No gage-height record July 6-25, July 27 to Aug. 5, Sept. 27 to Oct. 10, 12-17, 19-27, 29, 30, Nov. 2-7, 9-14, 16-20, 22-28, Dec. 7-10, 12, 14-31, 1919; Jan. 1-3, 5-8, 16, Mar. 15-19, June 27 to July 4, July 6-9, 11-17, Aug. 19-20, Aug. 29 to Sept. 10, 12-17, and 23-24, 1920. Discharge estimated by comparison with flow of Eagle at Redcliff, Fryingpan at Thomasville, and study of Weather Bureau records. Stage-discharge relation affected by ice Nov. 30, 1919, to Jan. 29, 1920, Jan. 31 to Feb. 6, Feb. 22 to Mar. 1, 7-10, 1920; discharge determined from study of gage-height and temperature record, discharge measurements, and observer's notes. Records discontinued during winter from Nov. 21, 1918, to Apr. 1, 1919.

Monthly discharge of Eagle River at Eagle, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	208	156	183	11,300
November 1-20	156	152	155	6,150
April	1,210	203	486	28,900
May	3,240	748	1,880	116,000
June	2,220	945	1,350	80,300
July	1,120	413	645	39,700
August	590	210	352	21,600
September	364	150	255	15,200
1919-20				
October	208	145	183	11,300
November	165	95	125	7,440
December	114	106	109	6,700
January	118	85	103	6,330
February	114	85	100	5,750
March	179	92	114	7,010
April	272	108	182	10,800
May	4,550	294	2,000	123,000
June	5,000	2,040	3,430	204,000
July	2,400	673	1,220	75,000
August	799	319	475	29,200
September	325	230	264	15,700
The year	5,000	85	692	502,000

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TURKEY CREEK AT REDCLIFF, COLO.

LOCATION.—In sec. 19, T. 6 S., R. 80 W., at highway bridge in Redcliff, Eagle County, 800 feet above mouth of creek.

DRAINAGE AREA.—27 square miles (measured on Forest Service atlas).

RECORDS AVAILABLE.—June 30, 1913, to September 30, 1920.

GAGE.—Chain attached to guardrail of bridge; read by employee of United States Forest Service. Prior to November 9, 1915, vertical staff of same datum on downstream side of left abutment.

DISCHARGE MEASUREMENTS.—Made from single-span bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of coarse gravel and small boulders; shifts. No well-defined control. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 3.5 feet at 8.15 p. m. May 28 (discharge, 232 second-feet); minimum stage recorded, 1.19 feet at 8 a. m. January 14 (discharge, 2 second-feet).

Maximum stage recorded during year ending September 30, 1920, 4.1 feet at 6 a. m. June 8 (discharge, 355 second-feet); minimum stage, 1.34 feet at 8 a. m. October 21 (discharge, 1 second-foot).

1913–1920: Maximum stage recorded, 4.7 feet at 7.15 p. m. June 13, 1918 (discharge, 670 second-feet); minimum discharge occurred in 1920.

ICE.—Stage-discharge relation seldom affected by ice.

DIVERSIONS.—Court decrees for diversion of 5.5 second-feet from Turkey Creek.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow. No artificial regulation.

ACCURACY.—Stage-discharge relation for extreme low stages changed slightly; not affected by ice. Three rating curves used; well defined below 200 second-feet and identical above 30 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except as noted in footnote to table of daily discharge. Records good except for periods of missing gage heights and during spring when there is diurnal fluctuation, for which they are fair.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Turkey Creek at Redcliff, Colo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft.*	1919		*Feet*	*Sec.-ft.*
Jan. 3	T. J. Watkins	1.32	6.0	Oct. 30	T. J. Watkins	1.57	6.2
May 25	J. B. Spiegel	3.13	165				
July 22	Robert Follansbee	1.79	20.1	1920			
				July 21	P. V. Hodges	1.96	34.2

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Daily discharge, in second-feet, of Turkey Creek at Redcliff, Colo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918-19												
1	8	7	5	5	------	------	9	29	104	46	23	------
2	8	7	5	5	------	------	6	31	79	45	23	------
3	8	8	5	5	4	------	12	33	91	43	20	------
4	8	8	6	5	------	------	8	29	85	38	19	------
5	8	7	6	5	4	------	10	28	79	38	18	------
6	8	7	6	5	4	------	11	36	79	38	19	------
7	8	7	6	5	4	------	8	37	79	39	19	------
8	8	6	6	5	4	------	8	37	72	37	19	------
9	8	6	5	4	------	------	8	38	76	35	19	------
10	8	6	6	4	4	------	7	40	79	35	19	------
11	6	6	5	4	4	------	7	36	79	33	18	------
12	7	6	5	4	4	------	7	39	79	33	19	14
13	7	8	5	4	4	------	7	47	91	32	17	------
14	7	7	5	2	------	------	8	68	91	31	14	------
15	5	7	5	4	------	------	8	64	85	31	14	------
16	6	5	5	4	------	------	8	91	85	33	14	------
17	7	5	5	4	------	------	12	91	85	30	14	------
18	7	5	5	4	------	------	16	85	85	30	15	------
19	7	6	5	4	------	------	20	111	79	26	14	------
20	7	7	5	4	------	------	24	118	70	25	14	------
21	7	5	5	3	------	------	32	148	72	23	13	------
22	7	6	5	3	------	------	37	148	66	23	14	------
23	6	5	5	4	------	------	37	148	66	28	14	------
24	7	6	5	4	------	------	41	164	64	26	14	------
25	7	6	4	4	------	------	42	164	56	29	15	------
26	7	6	4	4	------	------	34	214	56	23	14	------
27	6	6	4	4	------	------	35	197	54	23	14	------
28	6	6	5	4	------	------	31	232	51	25	13	14
29	7	6	5	4	------	8	26	197	48	25	14	------
30	7	6	5	4	------	7	26	180	46	23	14	------
31	6	------	4	4	------	10	------	148	------	22	14	------
1919-20												
1	8	8	5	3	3	3	5	18	214	91	24	12
2	8	6	6	2	2	4	3	22	251	79	23	12
3	10	6	6	3	3	3	2	25	251	79	22	12
4	8	7	4	3	2	3	2	30	251	79	22	12
5	8	6	6	3	2	3	3	34	270	74	20	12
6	8	6	4	3	3	3	3	38	270	74	20	12
7	8	8	4	4	3	2	4	41	270	68	19	12
8	8	6	6	2	3	3	6	49	333	68	19	12
9	8	4	3	3	2	3	11	63	290	58	19	11
10	8	6	5	2	2	3	14	58	270	54	19	11
11	6	7	5	2	2	2	8	49	214	50	19	11
12	6	6	4	2	2	3	8	41	214	50	20	11
13	6	6	4	3	2	2	8	38	197	50	19	11
14	7	6	5	3	2	3	10	38	197	50	17	11
15	7	5	4	2	3	12	11	41	197	50	17	11
16	6	6	2	3	2	5	8	45	197	50	17	11
17	6	6	2	2	2	3	8	58	180	50	17	11
18	6	5	3	3	2	3	4	63	180	46	17	11
19	7	6	3	2	2	4	5	85	180	46	17	11
20	7	8	2	2	2	8	4	118	148	42	16	11
21	2	7	2	2	2	12	4	133	133	33	15	10
22	8	6	2	2	2	8	4	133	118	32	13	10
23	5	7	3	2	2	4	5	133	118	34	13	10
24	6	8	2	2	2	4	4	164	118	35	13	9
25	6	8	2	2	2	4	4	214	118	34	13	9
26	7	9	4	2	2	4	4	214	104	35	12	9
27	6	6	3	3	3	4	5	133	104	31	13	9
28	9	4	3	3	3	4	4	180	104	28	14	9
29	9	4	2	2	3	4	7	251	91	28	12	9
30	7	6	3	2	------	4	11	251	91	26	12	9
31	7	------	3	3	------	6	------	232	------	24	12	------

NOTE.—Gage not read Oct. 6, 13, 20, 27, Nov. 3, 10, 17, 19, 24, 26, 28, 30, Dec. 1, 8, 1918, Jan. 1, 5, 12, 19, 21, 23, 26, July 12, and Aug. 26, 1919; discharge interpolated. Gage not read Feb. 1, 2, 4, 9, 13-28, Mar. 1-28, Aug. 30, 31, Sept. 1-11, 13-27, 29, 30, 1919, and Aug. 30 to Sept. 11, 1920; discharge estimated by means of weather records or comparison with flow of Fryingpan Creek at Thomasville, as follows: February, 4 second-feet; March, 1919, 5 second-feet; Aug. 30 and 31, 1919, as shown in table; September, 1919, 17 second-feet; and Aug. 30 to Sept. 11, 1920, as shown in table.

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Monthly discharge of Turkey Creek at Redcliff, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	8	5	7.1	437
November	8	5	6.3	375
December	6	4	5.1	314
January	5	2	4.1	252
February			4	222
March			5	307
April	42	6	18.2	1,080
May	232	28	97.7	6,010
June	104	46	74.4	4,430
July	46	22	31.2	1,920
August	23	13	16.3	1,000
September			17.0	1,010
The year	232		24.0	17,400
1919–20				
October	10	2	7.0	430
November	9	4	6.3	375
December	6	2	3.6	221
January	4	2	2.5	154
February	3	2	2.3	122
March	12	2	4.3	264
April	14	2	6.0	357
May	251	18	96.5	5,930
June	333	91	189	11,200
July	91	24	49.9	3,070
August	24	12	16.9	1,040
September	12	9	10.7	637
The year	333	2	33.0	23,800

NOTE.—See footnote to table of daily discharge.

ROARING FORK AT ASPEN, COLO.

LOCATION.—In sec. 7, T. 10 S., R. 84 W., at bridge near old power plant at Aspen, Pitkin County. Castle, Maroon, and Hunter creeks enter below.

DRAINAGE AREA.—109 square miles (measured on topographic map).

RECORDS AVAILABLE.—February 25, 1915, to September 30, 1920. From January 1, 1911, to February 24, 1915, station was maintained just below Cooper Avenue Bridge, three-quarters of a mile upstream.

GAGE.—Vertical staff at downstream end of right bridge abutment; read by Francis and Clement McDonnell.

DISCHARGE MEASUREMENTS.—Made from single-span bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of small boulders; fairly smooth and practically permanent. No well-defined control. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 4.3 feet at 8 a. m. May 28 (discharge, 1,120 second-feet); minimum stage, 0.25 foot at 8 a. m. March 11 (discharge, 15 second-feet).

Maximum stage recorded during year ending September 30, 1920, 4.8 feet at 8 a. m. June 9 (discharge, 1,510 second-feet); minimum stage, 0.40 foot several times during winter (discharge, 19 second-feet).

1911–1920: Maximum stage recorded, 7.1 feet during night of June 18, 1917, determined from high-water marks (discharge, 3,170 feet-second); minimum discharge occurred in 1919.

ICE.—Stage-discharge relation seldom affected by ice.

DIVERSIONS.—Salvation ditch, which has a decree for 58 second-feet, diverted 3,400 acre-feet above station from June 1 to September 30, 1919. Very little water was diverted during 1920. Prior to April 15, 1919, the mines at Aspen pumped about 6 second-feet into the river which enters above the station.

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REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow. No artificial regulation.

ACCURACY.—Stage-discharge relation permanent except as affected by ice November 26–28, 1919. Rating curve well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except as noted in footnote to table of daily discharge. Records excellent except during spring when there is diurnal fluctuation, for which period they are good.

Discharge measurements of Roaring Fork at Aspen, Colo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
1918				1919			
Nov. 22	Robert Follansbee	0.90	50	Oct. 25	T. J. Watkins	0.80	42.1
1919				1920			
Jan. 1	T. J. Watkins	.65	32.1	June 21	Robert Follansbee	3.59	659
June 18	Robert Follansbee	3.43	592	22	do	4.02	916
July 21	do	1.59	136				

Discharge measurements of Salvation ditch at Aspen, Colo., during the year ending Sept. 30, 1919

[Made by Robert Follansbee]

Date	Gage height	Dscharge
	Feet	*Sec.-ft.*
June 18	1.60	13
July 20	.85	2

Daily discharge, in second-feet, of Roaring Fork at Aspen, Colo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	68	63	49	29	30	24	40	148	430	289	181	26
2	74	68	49	37	28	25	40	156	362	350	190	27
3	74	68	49	35	31	28	38	133	325	338	181	29
4	68	68	41	35	33	30	38	133	300	278	148	29
5	68	68	34	33	29	23	42	148	257	257	126	31
6	68	68	41	31	29	24	40	181	278	228	104	31
7	68	68	49	30	29	23	37	181	289	237	98	32
8	68	65	49	32	29	28	33	181	325	208	104	34
9	68	65	49	31	31	21	28	190	325	199	104	35
10	79	65	45	32	30	23	31	190	400	181	91	40
11	79	65	45	30	29	21	33	172	465	164	85	41
12	74	60	34	32	28	26	35	181	500	156	79	43
13	68	60	34	30	28	34	33	199	535	156	74	58
14	68	60	31	29	28	24	35	228	500	164	63	91
15	68	58	28	33	28	24	34	289	500	164	58	104
16	74	58	38	30	31	21	33	312	535	164	54	111
17	79	58	45	31	26	26	35	400	575	148	40	79
18	74	58	48	32	26	26	49	448	535	148	44	79
19	68	57	58	31	26	28	74	535	535	164	54	63
20	68	57	49	29	27	29	91	670	535	148	49	63
21	68	56	38	29	25	29	126	785	535	133	46	54
22	74	56	33	29	27	30	172	845	575	118	40	49
23	74	56	38	29	24	28	228	785	430	104	34	46
24	68	55	32	24	29	26	218	785	415	91	33	42
25	74	55	35	27	24	26	218	910	415	91	35	42
26	74	54	33	28	28	28	199	980	375	85	33	49
27	68	68	42	31	30	28	199	980	350	79	30	49
28	63	49	40	33	25	29	164	980	325	98	33	43
29	63	54	38	33	.....	29	133	910	300	111	33	41
30	68	49	40	31	.....	32	133	845	300	133	29	.....
31	63	.....	35	34	.....	35	.....	725	.....	126	31	.....

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Daily discharge, in second-feet, of Roaring Fork at Aspen, Colo., for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919–20												
1	41	34	38	34	26	34	37	72	785	785	218	89
2	40	41	37	32	25	35	31	79	670	785	218	79
3	35	38	34	29	27	34	29	107	910	725	237	74
4	45	38	38	27	25	32	33	94	845	670	218	78
5	58	40	38	31	26	32	31	121	845	670	237	208
6	58	38	35	30	24	35	31	134	845	575	199	81
7	49	38	38	33	31	31	33	127	1,270	535	181	75
8	49	40	33	34	31	40	37	151	1,350	500	172	68
9	54	40	33	26	33	37	45	190	1,430	465	151	69
10	49	39	33	27	30	34	46	208	1,120	448	156	70
11	45	42	40	27	33	34	38	208	1,120	430	145	67
12	45	43	40	24	27	32	38	181	1,050	400	126	58
13	45	30	33	24	33	32	39	172	1,050	415	126	54
14	47	36	30	27	34	40	45	154	1,200	388	111	49
15	46	35	34	34	37	24	45	148	1,120	350	104	58
16	38	40	34	30	37	40	40	139	1,050	400	107	59
17	35	35	34	27	33	31	42	151	980	400	96	63
18	40	34	34	27	38	34	38	190	845	325	98	64
19	45	38	33	23	35	34	40	278	670	325	111	58
20	45	40	32	22	35	44	40	400	670	338	133	62
21	46	37	33	25	34	40	40	482	785	312	133	63
22	41	37	34	25	35	33	38	325	980	278	133	68
23	41	35	40	24	40	31	38	500	980	278	107	63
24	46	35	33	21	33	27	40	620	910	278	104	63
25	42	35	38	30	33	27	41	845	910	325	99	74
26	42	34	38	23	33	35	41	845	785	388	94	56
27	42	34	40	22	33	35	37	575	980	289	126	68
28	38	43	38	24	33	33	40	620	910	257	107	70
29	41	42	29	24	40	30	46	910	910	257	92	46
30	40	41	33	24	------	32	56	980	845	208	90	56
31	37	------	28	28	------	33	------	1,120	------	218	84	------

NOTE.—Gage not read Oct. 27, Nov. 3–4, 7–16, and 18–26, 1918; discharge estimated by means of temperature record. Stage-discharge relation affected by ice Nov. 26–28, 1919; discharge ascertained by means of gage-height and temperature records.

Monthly discharge of Roaring Fork at Aspen, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	79	63	70.3	4,330
November	68	49	60.3	3,590
December	58	28	40.9	2,510
January	37	24	31.0	1,910
February	33	24	28.1	1,560
March	35	21	26.7	1,640
April	228	28	87.0	5,180
May	980	133	471	28,900
June	575	257	418	24,900
July	350	79	171	10,500
August	190	29	74.3	4,570
September	111	26	50.1	2,980
The year	980	21	128	92,700
1919–20				
October	58	35	44.0	2,700
November	43	30	37.7	2,240
December	40	28	35.0	2,150
January	34	21	27.0	1,660
February	40	24	32.2	1,850
March	40	24	33.7	2,070
April	56	29	39.2	2,330
May	1,120	72	369	22,100
June	1,430	670	961	57,200
July	785	208	420	25,800
August	237	84	139	8,550
September	208	46	70.3	4,180
The year	1,430	21	183	133,600

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ROARING FORK AT GLENWOOD SPRINGS, COLO.

LOCATION.—In sec. 9, T. 6 S.. R. 89 W., at Glenwood Springs. Garfield County, 1,500 feet above mouth of river.

DRAINAGE AREA.—1,460 square miles (revised; measured on base map of Colorado).

RECORDS AVAILABLE.—April 6, 1906, to September 30, 1909; September 21, 1910, to September 30, 1920.

GAGE.—Gurley water-stage recorder; installed October 27, 1917, and referred to inclined staff, on left bank 800 feet above highway bridge, and used since November 20, 1915; inspected by employee of United States Forest Service. Chain gage on downstream side of highway bridge used prior to November 20, 1915; relation between gages not determined.

DISCHARGE MEASUREMENTS.—Made from single-span highway bridge.

CHANNEL AND CONTROL.—Bed composed of boulders and coarse gravel; slightly shifting. No well-defined control. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 5.15 feet at 6 a. m. May 29 (discharge, 7,590 second-feet); minimum stage, 0.68 foot at 7 p. m. March 11 (discharge, 357 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 6.8 feet at 8 a. m. June 9 (discharge, 12,300 second-feet); minimum stage, 0.65 foot at 8 p. m. March 7 (discharge, 344 second-feet).

1906–1909; 1910–1920: Maximum stage recorded, 8.45 feet at 8 a. m. June 14, 1918 (discharge, 17,600 second-feet); minimum discharge, 270 second-feet January 23, 1911 (gage height, 0.90 foot).

ICE.—Stage-discharge relation not seriously affected by ice except for short periods.

DIVERSIONS.—Court decrees for diversion of 164 second-feet from Roaring Fork between Glenwood Springs and Aspen.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow. No artificial regulation.

ACCURACY.—Stage-discharge relation shifted slightly; affected by ice during January, 1919. Three well defined rating curves used; one applicable from October 1, 1918, to July 15, 1919, and December 1, 1919, to September 3, 1920, one from July 16 to November 30, 1919, and the other from September 4 to 30, 1920; shifting-control method used December 1–10, 1919, and September 4–29, 1920. Operation of water-stage recorder satisfactory except for short periods during winter. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph except as noted in footnote to table of daily discharge. Records excellent except for periods of ice effect and of missing gage heights, for which they are fair.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Roaring Fork at Glenwood Springs, Colo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
1918				1919			
Nov. 22	Robert Follansbee	1.12	608	Oct. 24	T. J. Watkins	1.07	636
Dec. 30	T. J. Watkins	*1.20	542				
				1920			
1919				Feb. 25	do	.80	414
Feb. 7	do	.84	460	Aug. 15	Robert Follansbee	1.90	1,360
June 18	Robert Follansbee	3.63	4,070				

* Stage-discharge relation affected by ice.

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Daily discharge, in second-feet, of Roaring Fork at Glenwood Springs, Colo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	880	851	640	475	494	427	797	1,900	3,980	2,540	1,320	512
2	860	842	596	475	463	433	806	2,040	3,210	2,620	1,590	531
3	870	833	610	475	433	421	788	1,970	2,780	2,700	1,900	557
4	842	815	596	488	415	421	719	1,900	2,460	2,390	1,590	544
5	842	815	589	501	427	390	744	2,040	2,240	2,170	1,290	544
6	833	797	589	520	427	410	833	2,240	2,170	2,040	1,160	557
7	815	762	610	534	410	410	702	2,170	2,460	2,320	1,070	612
8	788	719	589	540	427	405	618	2,040	2,700	2,100	1,060	612
9	806	702	575	540	433	421	589	2,100	2,780	1,900	1,030	640
10	910	710	589	540	439	390	561	2,100	3,210	1,780	1,030	724
11	920	719	589	540	433	390	561	1,970	3,880	1,650	989	749
12	889	728	582	540	433	421	561	1,900	3,980	1,540	917	749
13	833	702	540	540	421	451	575	1,970	4,080	1,540	872	908
14	824	710	514	540	421	475	648	2,170	3,980	1,540	827	1,110
15	806	719	534	540	400	427	625	2,540	4,380	1,650	774	1,280
16	797	719	554	540	421	410	632	2,620	4,280	1,470	782	1,110
17	815	662	608	527	433	433	685	3,210	4,480	1,390	700	989
18	815	648	554	501	457	475	851	3,680	4,280	1,350	700	944
19	806	678	501	514	439	547	1,120	4,480	4,180	1,370	692	953
20	788	678	514	514	415	596	1,360	4,900	4,080	1,270	692	908
21	806	655	540	514	415	640	1,540	5,460	3,780	1,170	670	872
22	824	655	527	514	427	670	1,900	5,700	3,590	1,090	655	827
23	824	625	488	520	445	685	2,320	5,580	3,300	1,020	640	809
24	833	640	488	514	439	596	2,540	5,700	3,300	962	626	792
25	890	640	488	475	400	514	2,540	5,700	3,210	926	612	774
26	842	568	475	475	433	520	2,320	6,440	2,940	890	591	740
27	824	554	469	475	463	561	2,390	6,440	2,860	890	577	749
28	860	603	469	475	421	608	1,970	6,690	2,860	917	570	783
29	851	603	508	475	-------	648	1,840	6,940	2,780	1,100	570	766
30	860	568	542	494	-------	744	1,780	6,440	2,700	1,370	544	740
31	842	-------	508	501	-------	788	-------	5,460	-------	1,270	531	-------
1919–20												
1	700	591	582	520	445	433	469	1,130	10,200	6,190	2,040	940
2	685	619	540	501	445	445	475	1,400	8,800	6,190	1,900	910
3	655	626	534	540	433	451	469	1,650	8,250	6,190	2,390	939
4	670	619	575	561	427	400	439	1,710	7,460	6,440	2,320	918
5	678	612	554	561	427	433	469	2,100	7,730	6,060	2,170	900
6	670	605	561	534	421	427	463	2,320	7,980	5,120	1,970	909
7	655	591	527	494	400	380	475	2,620	9,360	4,700	1,840	918
8	685	640	527	469	427	390	561	2,940	9,920	4,380	1,710	918
9	700	626	451	445	433	439	648	3,400	10,800	4,280	1,650	936
10	708	598	405	494	410	433	788	3,680	9,640	3,980	1,540	918
11	715	598	501	488	410	427	744	3,400	8,520	3,980	1,540	872
12	700	598	547	475	380	410	648	3,120	7,980	3,780	1,430	846
13	715	557	488	488	415	415	632	3,030	8,520	3,780	1,430	826
14	732	557	433	534	405	439	670	3,500	8,520	3,500	1,320	801
15	724	570	390	545	390	421	728	3,030	8,250	3,400	1,320	783
16	708	570	390	556	390	395	797	2,860	8,250	3,400	1,260	756
17	678	564	439	568	385	475	719	3,030	7,200	3,210	1,210	765
18	670	557	494	501	400	427	632	3,980	6,440	3,210	1,180	774
19	655	544	520	475	405	400	589	5,010	5,820	2,860	1,180	765
20	655	557	514	482	421	451	596	6,190	5,460	2,860	1,290	747
21	633	564	547	469	405	475	610	7,200	5,820	2,860	1,300	756
22	640	557	561	469	421	540	568	9,080	6,440	2,620	1,240	774
23	648	554	554	463	457	554	589	7,720	6,690	3,210	1,150	774
24	662	550	540	445	433	520	610	7,460	6,690	3,030	1,110	765
25	724	550	520	427	410	527	610	8,800	6,690	2,740	1,070	846
26	732	598	582	439	405	508	582	9,640	6,690	3,300	1,050	837
27	724	550	547	433	431	501	582	7,980	6,440	2,620	1,080	827
28	662	538	520	427	457	469	589	7,980	6,440	2,240	1,110	828
29	662	550	514	433	433	451	648	8,800	6,440	2,100	1,050	801
30	715	577	501	433	-------	451	806	9,360	6,190	1,970	1,010	783
31	715	-------	527	433	-------	469	-------	9,920	-------	1,900	980	-------

NOTE.—No gage-height record Dec. 8–13, 22–27, 29–31, 1918, and Jan. 1–3, 1919; stage-discharge relation affected by ice Jan. 4–21 and 27, 1919; discharge ascertained by means of discharge measurement and temperature and gage-height records. No gage-height record Nov. 23, 1919, Jan. 15, 16, and Feb. 27, 1920; discharge interpolated.

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Monthly discharge of Roaring Fork at Glenwood Springs, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	920	788	838	51,500
November	851	554	697	41,500
December	640	469	547	33,600
January	540	475	510	31,400
February	494	409	432	24,000
March	788	390	507	31,200
April	2,540	561	1,200	71,400
May	6,940	1,900	3,760	231,000
June	4,480	2,170	3,360	200,000
July	2,700	890	1,580	97,200
August	1,900	531	889	54,700
September	1,280	512	780	46,400
The year	6,940	390	1,260	914,000
1919-20				
October	732	633	686	42,200
November	640	538	580	34,500
December	582	390	512	31,500
January	568	427	487	29,900
February	457	380	418	24,000
March	544	380	450	27,700
April	806	439	607	36,100
May	9,920	1,130	4,970	306,000
June	10,800	5,460	7,650	455,000
July	6,440	1,900	3,750	231,000
August	2,390	980	1,450	89,200
September	940	747	838	49,900
The year	10,800	380	1,870	1,360,000

CASTLE CREEK NEAR ASPEN, COLO.

LOCATION.—In sec. 35, T. 10 S., R. 85 W., 75 feet below highway bridge, in Sopris National Forest, 4½ miles above Aspen, Pitkin County. No inflow below, except spring run-off from small gulches; nearest tributary above, Conundrum Creek, enters 1 mile upstream.

DRAINAGE AREA.—62 square miles (measured on topographic map).

RECORDS AVAILABLE.—February 16, 1911, to January 31, 1920, when station was discontinued.

GAGE.—Gurley water-stage recorder on left bank, 75 feet below bridge; inspected by employee of United States Forest Service. Staff gage on opposite bank at datum 1.0 foot higher than present gage, used February 16, 1911, to February 28, 1912. Vertical staff on right abutment of bridge at present datum used February 29, 1912, to April 11, 1915, but owing to slope of stream gage readings were somewhat higher.

DISCHARGE MEASUREMENTS.—Made from two-span bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of coarse gravel; shifts during high water. Control is small rapids just below cable; shifting at intervals. Left bank high and not subject to overflow; right bank will be overflowed for a distance of 75 feet at gage height 4.3 feet.

EXTREMES OF DISCHARGE.—Maximum stage during period October 1, 1918, to January 31, 1920, from water-stage recorder, 2.2 feet at 9 p. m. June 16, 1919 (discharge, 435 second-feet); minimum stage, 0.38 foot at 6 a. m. February 15, 1919 (discharge, 24 second-feet).

1911-1920: Maximum stage recorded, 3.9 feet at 7 p. m. June 15, 1918 (discharge, 1,090 second-feet); minimum discharge recorded, 23 second-feet on November 7 and December 5, 1912.

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ICE.—Stage-discharge relation not seriously affected by ice.

DIVERSIONS.—No water diverted above station except possibly for a small amount of meadow irrigation. Court decrees for diversion of 160 second-feet below station.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow.

ACCURACY.—Stage-discharge relation practically permanent except as slightly affected by ice December 26, 1918, to January 1, 1919. Rating curve well defined. Operation of water-stage recorder was satisfactory except for short periods. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspection of recorder graph, except as noted in footnote to table of daily discharge. Records excellent except for periods of ice effect and of missing gage heights, for which they are fair.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Castle Creek near Aspen, Colo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by-	Gage height	Discharge
1918		*Feet*	*Sec.-ft.*	1919		*Feet*	*Sec.-ft.*
Nov. 21	Robert Follansbee	0.62	47.6	Oct. 25	T. J. Watkins	0.70	52
1919				1920			
Jan. 1	T. J. Watkins	.50	30.0	Feb. 27	do	.60	40.3
June 17	Robert Follansbee	1.80	320				

Daily discharge, in second-feet, of Castle Creek near Aspen, Colo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	63	55	41	30	34	31	31	73	210	268	225	68
2	64	55	38	35	34	28	31	72	200	292	182	68
3	64	54	40	36	34	25	29	73	180	295	182	68
4	62	52	42	36	32	27	29	83	160	252	150	64
5	61	51	42	36	34	29	30	80	150	225	119	68
6	60	50	42	36	34	29	31	90	160	222	110	72
7	60	47	42	37	32	30	30	90	168	222	121	76
8	60	46	42	37	30	31	29	91	178	205	123	73
9	61	43	42	37	30	32	28	97	188	190	112	78
10	64	42	42	36	30	31	28	97	240	178	110	90
11	68	42	42	36	30	31	28	81	283	165	102	81
12	65	42	42	36	30	31	28	80	265	161	102	91
13	63	41	42	36	29	34	29	84	277	188	97	108
14	61	41	42	35	30	35	31	102	295	178	90	161
15	60	40	41	35	29	32	30	125	330	205	86	152
16	63	41	41	36	28	32	30	135	348	165	86	119
17	65	40	41	36	29	32	34	172	348	147	88	104
18	64	45	36	36	31	34	42	205	348	141	86	99
19	63	46	34	36	32	34	48	235	330	141	88	90
20	61	46	37	36	31	34	56	260	312	129	86	84
21	60	45	36	34	31	32	61	286	286	121	80	80
22	62	43	35	32	30	32	70	295	290	114	78	75
23	62	41	36	34	31	32	84	283	277	106	76	73
24	61	41	31	32	30	32	97	295	286	112	75	70
25	58	40	32	30	29	32	102	312	283	112	73	67
26	56	38	30	29	31	31	91	348	268	112	73	67
27	54	38	28	31	29	30	90	348	265	115	75	66
28	55	38	30	29	32	30	81	365	268	117	75	66
29	55	42	30	30	.....	30	75	348	290	129	70	64
30	55	42	30	30	.....	34	73	312	277	198	67	61
31	55	.....	30	32	.....	32	.....	265	.....	172	66	.....

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Daily discharge, in second-feet, of Castle Creek near Aspen, Colo., for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Day	Oct.	Nov.	Dec.	Jan.
1919-20					1919-20				
1	60	50	48	41	16	56	51	45	37
2	58	50	46	41	17	55	51	45	37
3	58	50	48	41	18	55	51	45	37
4	61	52	47	41	19	54	51	45	37
5	56	51	46	41	20	51	51	43	36
6	55	51	45	41	21	50	51	43	36
7	55	51	43	38	22	52	47	43	35
8	58	51	42	38	23	55	48	43	35
9	56	51	30	38	24	55	47	43	35
10	55	51	35	40	25	55	47	43	35
11	56	51	41	38	26	55	48	43	35
12	56	47	45	40	27	55	45	42	35
13	58	47	42	40	28	50	47	42	35
14	58	50	43	38	29	54	47	42	35
15	58	50	45	38	30	54	48	41	35
					31	54	-------	41	35

NOTE.—Recorder not in operation Oct. 1-25, Dec. 5-6, 8-13, 1918, June 1-6, Aug. 3-4, Oct. 11-12, Nov. 29-30, Dec. 28-31, 1919, and Jan. 1, 2, 24-31, 1920; discharge ascertained by comparison with flow of Roaring Fork at Aspen. Stage-discharge relation affected by ice Dec. 26, 1918, to Jan. 1, 1919; discharge ascertained by means of one discharge measurement and temperature record.

Monthly discharge of Castle Creek, Aspen, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	68	54	60.8	3,740
November	55	38	44.2	2,630
December	42	28	37.4	2,300
January	37	29	34.1	2,100
February	34	28	30.9	1,720
March	35	26	31.3	1,920
April	102	28	49.2	2,930
May	365	72	187	11,500
June	348	150	258	15,400
July	295	106	173	10,600
August	225	66	102	6,270
September	161	61	83.4	4,960
The year	365	25	91.2	66,100
1919-20				
October	61	50	55.5	3,410
November	52	45	49.4	2,940
December	48	30	43.1	2,650
January	41	35	37.5	2,300
The period	----------	----------	----------	11,300

FRYINGPAN CREEK AT THOMASVILLE, COLO.

LOCATION.—In sec. 7, T. 8 S., R. 83 W., at private bridge 1,000 feet southwest of railroad station at Thomasville, Pitkin County. Nearest tributary, Deadman Gulch, enters a quarter of a mile below.

DRAINAGE AREA.—175 square miles (measured on Forest Service atlas and topographic map).

RECORDS AVAILABLE.—February 26, 1915, to June 30, 1920, when station was discontinued. From January 2, 1911, to February 25, 1915, station was maintained 1 mile downstream.

GAGE.—Stevens water-gage recorder installed May 11, 1918, and referred to previously used vertical staff on upstream side of right bridge abutment; inspected by employee of United States Forest Service.

DISCHARGE MEASUREMENTS.—Made from single-span bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of large boulders; rough and apparently permanent. No well-defined control. Banks not subject to overflow.

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EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 4.75 feet at midnight May 28 (discharge, 1,680 second-feet); minimum discharge occurred during winter.

Maximum stage during period October 1, 1919, to June 30, 1920, from water-stage recorder, 5.45 feet at 11 p. m. June 8 (discharge, 2,180 second-feet); minimum discharge occurred during winter.

1911–1920: Maximum stage recorded, 7.0 feet at 9 a. m. June 18, 1917 (discharge, 2,780 second-feet); minimum discharge, 16 second-feet January 2, 1911, when stage-discharge relation was affected by ice.

ICE.—Stage-discharge relation not seriously affected by ice.

DIVERSIONS.—No court decrees for diversion of water above station.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow.

ACCURACY.—Stage-discharge relation probably permanent. Rating curve, defined by discharge measurements made during 1918, assumed applicable to June 30, 1920. Operation of water-stage recorder satisfactory except for short periods as noted in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspection of recorder graph except as indicated in footnote to table of daily discharge. Records probably good although lack of base data introduces some uncertainty.

COOPERATION.—Gage-height record furnished by United States Forest Service.

No discharge measurements were made at this station during the period October 1, 1918, to June 30, 1920.

Daily discharge, in second-feet, of Fryingpan Creek at Thomasville, Colo., for the period Oct. 1, 1919, to June 30, 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	106	92					53	395	770	395	218	52
2	102	96					53	418	680	462	303	52
3	102	100					53	330	580	440	338	58
4	90	96					53	310	540	310	243	57
5	85	92					50	350	470	274	183	54
6	81	87					46	440	510	274	154	54
7	74	81					42	418	540	290	141	56
8	71	78				39	39	395	585	280	138	52
9	74	78	60				42	395	612	274	145	89
10	100	71				39	45	395	778	240	149	85
11	110						48	395	805	224	130	74
12	96		60				51	395	865	208	123	70
13	92					39	61	418	865	240	108	104
14	87						71	510	865	274	98	166
15	81						70	535	925	274	96	152
16	79						71	560	865	274	94	123
17	87						87	695	925	230	92	102
18	81						130	925	865	200	90	96
19	81						180	1,120	750	230	88	104
20	76						257	1,180	750	190	85	88
21	78						310	1,310	695	152	78	79
22	87						440	1,310	640	149	71	71
23	87						560	1,310	585	138	68	64
24	83						560	1,240	612	119	66	61
	88						535	1,240	560	121	64	58
	87						462	1,380	510	119	61	54
	98						418	1,380	485	123	60	54
	96						330	1,380	462	130	64	54
	94						292	1,440	440	166	58	52
	94						330	1,310	418	200	54	50
	92							1,130		194	53	

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Daily discharge, in second-feet, of Fryingpan Creek at Thomasville, Colo., for the period Oct. 1, 1919, to June 30, 1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919–20												
1	48	43						170	1,720			
2	45	47						194	1,510			
3	43	45		41			45	257	1,380			
4	46	42						292	1,310			
5	50	46						372	1,440			
6	50	42				41		395	1,650			
7	49	49			45			440	1,790			
8	53	41						505	1,860			
9	59	39						585	1,860			
10	58	39		39			100	612	1,650			
11	58	39						510	1,510			
12	57	39						462	1,440			
13	64	39				39		462	1,510			
14	66	39			39			510	1,510			
15	66	40					92	462	1,460			
16	58	40						470	1,460			
17	60	39		39			88	480	1,300			
18	52	38						690	1,170			
19	56	37						880	1,050			
20	44	38				49		1,080	1,050			
21	41	39			39			1,270	1,050			
22	43	39						1,310	1,180			
23	42	39						1,240	1,180			
24	41	39		39			68	1,650	1,180			
25	43	40						1,930	1,120			
26	46	40						1,860	1,120			
27	42	39	44			45		1,650	1,100			
28	39	39			41			1,580	1,100			
29	38	40						1,720	1,080			
30	37	40						1,790	1,060			
31	39			39				1,860				

NOTE.—Water-stage recorder not operating Nov. 11, 1918, to Mar. 31, 1919; discharge not determined. Recorder not operating Apr. 1–3, 5–7, 9–11, 13, June 1–7, July 6–8, 15–20, Oct. 29–31, Nov. 11–30, 1919, May 16–21, June 12–18, and 27–30, 1920; discharge estimated or interpolated on basis of a comparison with flow of Roaring Fork at Aspen and at Glenwood Springs. During the period Dec. 1, 1919, to Apr. 30, 1920, staff gage was read on days for which discharge is shown; mean monthly discharge for this period was estimated as follows: December, 1919, 42 second-feet; January, 1920, 39 second-feet; February, 1920, 41 second-feet; March, 1920, 44 second-feet; and April, 1920, 86 second-feet.

Monthly discharge of Fryingpan Creek at Thomasville, Colo., for the period October 1, 1919, to June 30, 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	110	71	88.4	5,440
November 1–10	100	71	87.1	1,730
April	560	39	191	11,400
May	1,440	310	807	49,600
June	925	418	665	39,600
July	462	119	232	14,300
August	338	53	120	7,380
September	166	50	75.2	4,470
1919–20				
October	66	37	49.5	3,040
November	49	37	40.5	2,410
December			42	2,580
January			39	2,400
February			41	2,360
March			44	2,700
April			86	5,120
May	1,930	170	893	54,900
June	1,860	1,050	1,360	80,900
The period				156,000

NOTE.—See footnote to table of daily discharge.

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TAYLOR RIVER AT ALMONT, COLO.

LOCATION.—In sec. 22, T. 51 N., R. 1 E., at highway bridge at Almont, Gunnison County, 300 feet above junction of Taylor and East rivers.

DRAINAGE AREA.—440 square miles (revised; measured on base map of Colorado, scale 1:500,000).

RECORDS AVAILABLE.—July 27, 1910, to September 30, 1920.

GAGE.—Vertical staff on downstream side of center pier; read by J. W. Brittain.

DISCHARGE MEASUREMENTS.—Made from two-span bridge.

CHANNEL AND CONTROL.—Bed composed of small boulders and coarse gravel; shifts slightly at intervals. No well-defined control. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 3.7 feet May 21, 22, and 26–30 (discharge, 1,670 second-feet); minimum discharge, estimated, 90 second-feet January 3–4 and February 2–5 (stage-discharge relation affected by ice).

Maximum stage recorded during year ending September 30, 1920, 5.00 feet at 7.25 a. m. June 9 (discharge, 3,760 second-feet); minimum stage recorded, 1.60 feet December 11 (discharge, 80 second-feet).

1910–1920: Maximum stage recorded, 5.00 feet at 7.25 a. m. June 9, 1920 (discharge, 3,760 second-feet); minimum stage, 1.2 feet on several days during August, 1913 (discharge, 50 second-feet).

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—No court decrees for diversion from Taylor River.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow.

ACCURACY.—Stage-discharge relation slightly shifting; affected by ice as noted in footnote to table of daily discharge.

Well-defined rating curves used October 1, 1918, to March 16, 1919, March 17, 1919, to February 18, 1920, and February 19 to September 30, 1920. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for periods of ice effect. Records can be considered only fair, because of possible effect of diurnal fluctuation, which is assumed to be the cause of a discrepancy between the discharge of Gunnison River near Gunnison and the combined discharge of East and Taylor rivers at Almont.

COOPERATION.—Gage-height record furnished by United States Bureau of Reclamation.

Discharge measurements of Taylor River at Almont, Colo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft.*	1920		*Feet*	*Sec.-ft.*
Jan. 9	T. J. Watkins	[a] 2.83	99	Jan. 9	T. J. Watkins	[a] 2.40	123
Feb. 21	do	[a] 2.18	106	Feb. 8	do	[a] 1.98	110
May 21	J. B. Spiegel	3.36	1,200	May 10	Robert Follansbee	2.97	789
June 12	Robert Follansbee	3.01	796	June 5	Foster and Elliott [b]	4.02	2,250
Nov. 11	T. J. Watkins	1.90	153	5	do	4.02	2,150
				July 25	P. V. Hodges	2.85	672

[a] Stage-discharge relation affected by ice.
[b] U. S. Bureau of Reclamation engineers.

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Daily discharge, in second-feet, of Taylor River at Almont, Colo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918-19												
1	225	218	160	115	98	109	143	438	890	605	498	169
2	225	218	152	100	90	109	149	448	740	605	498	169
3	222	218	127	90	90	110	155	380	690	945	448	162
4	218	218	122	90	90	112	155	416	648	605	375	162
5	218	218	127	95	90	112	166	465	605	530	328	158
6	225	218	135	100	92	109	180	498	690	530	315	172
7	225	218	135	100	95	108	186	498	740	530	315	190
8	234	218	135	100	98	106	172	465	740	465	302	190
9	234	218	135	99	98	106	155	465	840	438	284	198
10	248	211	135	99	100	106	152	454	1,000	360	279	194
11	230	211	135	99	100	106	166	438	1,000	360	279	190
12	225	211	135	99	104	106	152	438	945	360	274	190
13	222	211	135	99	108	106	183	438	890	365	266	190
14	211	204	135	99	110	106	183	568	945	426	262	315
15	214	204	135	99	114	106	183	690	945	375	262	292
16	218	190	138	99	115	108	202	740	945	375	262	280
17	218	178	140	99	112	92	230	840	945	385	262	246
18	218	178	140	99	109	118	370	740	790	356	262	206
19	218	178	140	99	108	149	498	1,180	840	400	242	198
20	218	178	138	99	106	166	498	1,450	740	375	226	194
21	218	178	135	99	106	137	465	1,450	740	356	206	190
22	218	178	133	98	106	131	498	1,600	690	324	190	190
23	218	178	131	97	106	131	530	1,450	648	315	199	186
24	218	175	121	97	106	131	498	1,320	648	292	190	180
25	218	166	115	97	106	128	498	1,180	648	270	190	176
26	218	160	100	98	106	115	416	1,600	605	270	190	169
27	218	160	100	98	108	115	410	1,600	605	270	190	169
28	218	160	106	98	109	115	385	1,600	605	270	190	169
29	218	160	115	97	-------	118	346	1,600	605	370	190	169
30	218	160	119	96	-------	125	421	1,600	605	410	183	169
31	218	-------	117	96	-------	143	-------	1,320	-------	438	176	-------
1919-20												
1	169	183	155	-------	-------	140	137	222	2,640	1,620	560	260
2	169	183	155	-------	-------	140	137	262	2,480	1,620	525	260
3	169	176	155	-------	-------	140	137	272	2,640	1,620	525	260
4	190	176	149	-------	-------	140	137	284	2,320	1,620	490	260
5	198	176	140	-------	-------	140	137	402	2,320	1,470	465	252
6	198	176	134	-------	-------	140	137	460	2,320	1,340	424	248
7	198	176	125	-------	-------	140	143	497	2,640	1,210	408	244
8	198	176	115	-------	-------	140	137	640	2,800	1,150	408	236
9	206	176	98	-------	-------	140	219	820	3,600	1,090	408	230
10	206	172	84	-------	-------	140	212	870	2,640	1,090	408	230
11	190	169	80	-------	-------	140	219	730	2,480	1,090	408	222
12	183	149	90	-------	-------	140	208	685	2,480	920	408	222
13	183	140	96	-------	-------	140	194	685	2,480	920	370	222
14	183	140	100	-------	-------	140	202	640	2,480	820	355	222
15	183	143	110	-------	-------	140	202	560	2,320	820	355	222
16	183	155	125	-------	-------	140	202	560	2,160	820	355	222
17	183	155	131	-------	-------	140	202	640	2,000	640	320	222
18	183	160	134	-------	-------	140	184	1,090	1,840	640	307	222
19	183	183	137	-------	-------	140	167	1,760	1,690	640	355	222
20	183	186	137	-------	-------	140	152	1,690	1,690	775	380	222
21	183	180	140	-------	-------	140	137	1,840	1,760	775	355	222
22	183	176	140	-------	-------	140	137	1,760	1,760	685	325	222
23	183	176	140	-------	-------	140	137	1,620	1,760	730	316	222
24	183	176	137	-------	-------	140	137	1,540	1,760	685	307	222
25	183	176	131	-------	-------	140	137	1,760	1,840	685	307	222
26	183	176	125	-------	-------	140	137	2,000	2,000	975	307	222
27	183	176	125	-------	-------	140	137	1,620	2,000	685	307	222
28	183	169	131	-------	-------	140	137	1,690	1,760	685	307	222
29	183	166	143	-------	-------	140	158	1,840	1,760	640	307	222
30	183	155	149	-------	-------	140	184	2,160	1,760	560	284	222
31	183	-------	149	-------	-------	140	-------	2,480	-------	525	264	-------

NOTE.—Stage-discharge relation affected by ice Nov. 23, 1918 to Mar. 16, 1919, Nov. 12-19, 1919, and Dec. 12, 1919, to Feb. 29, 1920; discharge ascertained by means of discharge measurements and temperature and gage-height records, as follows: Nov. 23, 1918, to Mar. 16, 1919; Nov. 12-19 and Dec. 12-31, 1919, as given in tables; January, 1920, 130 second-feet; and February, 1920, 140 second-feet.

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Monthly discharge of Taylor River at Almont, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	248	211	221	13,600
November	218	160	193	11,500
December	160	100	130	7,990
January	115	90	98.3	6,040
February	115	90	108	5,720
March	166	92	117	7,190
April	530	143	292	17,400
May	1,600	380	915	56,300
June	1,000	605	766	45,600
July	945	270	419	26,800
August	498	176	269	16,500
September	315	158	198	11,800
The year	1,600	90	311	225,000
1919–20				
October	206	169	186	11,400
November	186	140	170	10,100
December	155	80	128	7,870
January	----------	----------	130	7,990
February	----------	----------	140	8,050
March	140	140	140	8,610
April	219	137	163	9,700
May	2,480	222	1,100	67,600
June	3,600	1,690	2,210	132,000
July	1,620	525	963	58,600
August	560	264	375	23,100
September	260	222	231	13,700
The year	3,600	----------	498	359,000

NOTE.—See footnote to table of daily discharge.

GUNNISON RIVER NEAR GUNNISON, COLO.

LOCATION.—In sec. 3, T. 49 N., R. 1 W., at highway bridge 2 miles west of Gunnison, Gunnison County. Nearest tributary, Tomichi Creek, enters 1 mile below.

DRAINAGE AREA.—1,010 square miles (measured on Hayden's atlas).

RECORDS AVAILABLE.—November 27, 1910, to November 30, 1914; April 27, 1916, to September 30, 1920.

GAGE.—Chain gage on downstream side of bridge; datum lowered 1.00 foot October 15, 1918; read by C. W. Chinery. From April 27 to September 30, 1916, vertical staff at right abutment having datum 0.15 foot higher. From April 27, 1916, to June 18, 1918, Bristol water-stage recorder referred to chain gage.

DISCHARGE MEASUREMENTS.—Made from single-span bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of coarse gravel and small boulders; shifts during high water. Control at well-defined rapids below bridge; shifting. Banks not subject to overflow except during extreme high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 3.8 feet at 7 a. m. May 21, 27, and 28 (discharge, 3,400 second-feet); minimum discharge, estimated, 126 second-feet January 2 (stage-discharge relation affected by ice).

Maximum stage recorded during year ending September 30, 1920, 5.15 feet at 7 p. m. June 1 (discharge, 7,680 second-feet); minimum discharge occurred during winter, when stage-discharge relation was affected by ice (minimum measured discharge, 167 second-feet January 10).

1910–1914; 1916–1920: Maximum stage recorded, 4.05 feet (old datum) at 8 a. m. June 13, 1918 (discharge, 11,400 second-feet); minimum discharge occurred in 1919.

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ICE.—Stage-discharge relation seriously affected by ice.

DIVERSIONS.—Court decrees for diversion of 274 second-feet from Gunnison River between this station and the forks at Almont.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent; seriously affected by ice. Three well-defined standard rating curves used; applicable October 1-14, 1918, October 15, 1918, to May 20, 1920, and June 1 to September 30, 1920; shifting-control method used October 1 to November 19, 1918, and May 21-31, 1920. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except as noted in footnote to table of daily discharge. Records considered only fair, owing to possible effect of diurnal fluctuation, which is probably the cause of a discrepancy between the discharge of Gunnison River near Gunnison and the combined discharge of East and Taylor rivers at Almont.

Discharge measurements of Gunnison River near Gunnison, Colo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1918		*Feet*	*Sec.-ft.*	1919		*Feet*	*Sec.-ft.*
Oct. 15	Robert Follansbee	[a] 1.66	339	Sept. 29	Robert Follansbee	1.22	276
1919				1920			
Jan. 8	T. J. Watkins	[b] 2.36	136	Jan. 10	T. J. Watkins	[b] 2.39	167
Feb. 20	do	[b] 1.96	153	Feb. 9	do	[b] 2.46	198
May 22	J. B. Spiegel	3.80	3,400	May 9	Robert Follansbee	3.28	2,360
June 13	Robert Follansbee	2.94	1,760	June 12	do	4.42	5,560
July 17	do	1.97	714	July 26	P. V. Hodges	3.04	2,180

[a] New datum. Gage height, −0.10 foot, referred to old datum.
[b] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Gunnison River near Gunnison, Colo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918-19												
1	365	334	264	132	150	150	325	1,120	1,880	953	834	312
2	365	334	264	126	147	154	302	1,220	1,540	926	761	312
3	365	334	248	129	141	162	280	1,150	1,220	926	962	312
4	365	312	240	132	142	166	280	1,170	1,120	1,100	874	280
5	345	312	240	134	147	170	325	1,310	1,120	1,100	917	302
6	345	312	240	135	150	170	325	1,400	1,090	1,000	691	320
7	345	312	226	138	160	170	280	1,350	1,150	930	636	334
8	385	312	232	136	170	170	194	1,310	1,120	842	691	348
9	377	299	224	144	182	185	185	1,290	1,120	818	691	356
10	365	312	220	147	182	194	200	1,229	1,220	842	656	366
11	365	312	220	147	182	208	240	1,350	1,470	803	586	395
12	365	312	220	147	176	220	220	1,070	1,470	768	586	415
13	345	312	216	147	170	232	200	998	1,620	733	518	445
14	345	299	216	147	166	240	220	1,290	1,470	696	518	534
15	348	289	216	147	164	256	260	1,290	1,620	768	470	500
16	356	289	216	147	162	264	260	1,400	1,620	733	470	455
17	348	289	220	147	160	280	302	1,700	1,790	733	470	445
18	334	289	220	147	158	280	395	2,060	1,620	663	450	380
19	334	289	216	147	154	302	670	2,440	1,470	663	435	320
20	334	290	212	147	153	302	775	2,820	1,380	628	430	312
21	334	290	208	147	154	280	935	3,100	1,350	593	410	312
22	334	272	208	147	154	280	1,170	2,920	1,350	579	400	312
23	334	232	200	150	154	280	1,400	3,010	1,290	537	370	312
24	312	232	194	150	154	280	1,290	2,720	1,230	558	361	302
25	312	228	185	150	150	280	1,290	2,820	1,190	537	361	280
26	312	228	154	150	150	280	1,230	2,820	1,150	534	361	280
27	320	232	144	147	150	260	1,090	3,100	1,120	558	352	280
28	334	240	150	147	150	260	962	3,100	1,120	476	328	298
29	334	232	150	150	.....	240	998	3,100	1,120	677	316	280
30	334	260	150	150	.....	280	1,070	2,820	1,020	768	316	280
31	334	.....	142	150	.....	316	.....	2,620	.....	733	316	.....

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Daily discharge, in second-feet, of Gunnison River near Gunnison, Colo., for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919–20												
1	280	325	302	------	------	289	220	705	7,480	3,960	1,290	513
2	280	325	325	------	------	298	220	810	6,820	3,580	1,130	513
3	260	325	289	------	------	302	240	810	6,730	3,700	1,240	513
4	248	325	316	------	------	298	240	980	6,520	3,580	1,130	513
5	272	325	326	------	------	316	260	1,290	6,520	3,340	1,180	513
6	289	325	325	------	------	325	325	1,290	6,380	3,000	1,130	513
7	280	325	289	------	------	348	325	1,790	6,820	2,680	985	513
8	316	325	325	------	------	396	420	2,160	7,100	2,480	1,030	461
9	272	325	326	------	------	460	509	2,440	6,820	2,290	1,080	450
10	272	302	302	------	------	370	470	2,440	6,240	2,110	900	450
11	280	316	272	------	------	348	470	2,060	5,570	2,110	980	398
12	280	316	240	------	------	325	445	2,060	5,220	2,110	860	398
13	280	325	185	------	------	445	395	2,480	5,220	1,940	820	398
14	260	325	170	------	------	348	420	2,250	5,570	1,860	780	393
15	280	316	160	------	------	302	395	1,970	5,510	1,780	780	393
16	280	302	166	------	------	260	348	1,840	5,220	1,700	780	421
17	302	280	182	------	------	280	325	2,340	4,640	1,620	705	398
18	289	280	208	------	------	260	325	2,780	4,090	1,620	705	398
19	325	280	216	------	------	260	302	3,720	3,830	1,620	780	398
20	325	280	216	------	------	280	325	4,750	3,830	1,620	900	393
21	325	272	216	------	------	325	302	5,080	3,830	1,620	742	398
22	316	272	232	------	------	302	280	5,220	3,960	1,700	742	398
23	325	272	240	------	------	280	272	4,920	3,700	1,620	705	398
24	325	272	240	------	------	260	325	5,510	4,220	1,620	635	393
25	325	280	240	------	------	240	325	5,860	4,220	1,620	600	421
26	325	280	240	------	------	220	348	6,960	4,220	1,940	660	421
27	325	272	240	------	------	200	370	6,670	4,360	1,550	660	393
28	325	289	240	------	------	194	420	6,090	4,090	1,200	600	398
29	325	289	240	------	------	200	420	6,240	3,960	1,240	600	393
30	325	280	240	------	------	240	544	6,380	3,830	1,240	565	393
31	325	------	240	------	------	200	------	6,670	------	1,180	545	------

NOTE.—Stage-discharge relation affected by ice Nov. 20, 1918, to Mar. 30, 1919, and Dec. 14, 1919, to Mar. 6, 1920; discharge ascertained by means of discharge measurements observer's notes, and gage-height and temperature records, as follows: Nov. 20, 1918, to Mar. 30, 1919, Dec. 14–31, 1919, and Mar. 1–6, 1920, as shown in tables; January, 1920, 225 second-feet; and February, 1920, 235 second-feet. Discharge, July 4–7, 1919, ascertained by comparison with combined flow of East and Taylor rivers at Almont.

Monthly discharge of Gunnison River near Gunnison, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	385	312	345	21,200
November	334	228	287	17,100
December	264	142	209	12,900
January	150	126	144	8,850
February	182	141	158	8,780
March	316	150	236	14,500
April	1,400	185	587	34,900
May	3,100	998	1,970	121,000
June	1,880	1,020	1,330	79,100
July	1,160	476	747	45,900
August	962	316	534	32,800
September	594	280	347	20,600
The year	3,100	126	578	418,000
1919–20				
October	325	248	298	18,300
November	325	272	302	18,000
December	325	160	250	15,400
January	------	------	225	13,800
February	------	------	235	13,500
March	460	194	296	18,200
April	544	220	353	21,000
May	6,960	705	3,440	212,000
June	7,480	3,700	5,220	311,000
July	3,960	1,180	2,110	130,000
August	1,290	545	838	51,500
September	513	393	421	25,000
The year	7,480	------	1,170	848,000

NOTE.—See footnote to table of daily discharge.

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GUNNISON RIVER NEAR GRAND JUNCTION, COLO.

LOCATION.—In NW. ¼ sec. 35, T. 1 S., R. 1 W., half a mile below Redlands Irrigation & Power Co.'s canal and 2 miles above Grand Junction, Mesa County, and mouth of river; below all tributaries.

DRAINAGE AREA.—8,020 square miles (revised; measured on base map of Colorado, scale 1:500,000).

RECORDS AVAILABLE.—April 1, 1917, to September 30, 1920. From October 19, 1894, to December 21, 1895, and May 2, 1897, to September 30, 1899, station maintained nearer mouth.

GAGE.—Vertical staff at left bank a quarter of a mile below canal intake; read by employees of Redlands Irrigation & Power Co.

DISCHARGE MEASUREMENTS.—Made from car and cable at gage section.

CHANNEL AND CONTROL.—Bed composed of well-compacted gravel; permanent. Control at rapids 500 feet downstream; practically permanent. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 8.0 feet at 8 a. m. May 22 (discharge, 11,000 second-feet); minimum stage recorded, 0.49 foot August 24 to September 1, September 6 and 7 (discharge, 11 second-feet).

Maximum stage recorded during year ending September 30, 1920, 14.95 feet at 8 a. m. and at noon May 23 (discharge, 35,300 second-feet); minimum stage recorded, 0.70 foot from 6 p. m. September 3 to 6 p. m. September 5 (discharge, 35 second-feet).

1917–1920: Maximum stage recorded in 1920; minimum stage in 1919.

ICE.—Stage-discharge relation seriously affected by ice at times.

DIVERSIONS.—Below all diversions from Gunnison River. Most of water diverted through Redlands canal is used for pumping and is returned to Colorado River below Gunnison River.

COMBINED FLOW.—Combined flow of Gunnison River and Redlands canal represents flow of Gunnison River which enters Colorado River, less about 25 second-feet which is used during irrigation season.

ACCURACY.—Stage-discharge relation practically permanent except as affected by ice. Rating curve well defined. Gage read to half-tenths twice daily. Daily discharge ascertained by applying daily mean gage height to rating table except as indicated in footnote to daily-discharge table. Open-water records excellent; winter records good.

COOPERATION.—Gage-height record for station on river and record of flow of Redlands canal furnished by Redlands Irrigation & Power Co.

Discharge measurements of Gunnison River near Grand Junction, Colo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1918		*Feet*	*Sec.-ft.*	1919		*Feet*	*Sec.-ft.*
Dec. 28	T. J. Watkins	2.70	976	Dec. 26	H. R. Oliver	[b] 4.28	902
1919				1920			
Feb. 6	do	2.56	800	Jan. 20	T. J. Watkins	[b] 4.28	926
Mar. 14	do	2.73	1,020	Feb. 29	do	2.60	974
Sept. 2	H. R. Oliver [a]	1.09	104	July 9	H. R. Oliver	5.47	4,470
Oct. 14	do	1.99	482	15	do	4.38	3,000
23	T. J. Watkins	2.49	851	Sept. 8	do	1.21	177

[a] Engineer, Redlands Irrigation & Power Co.
[b] Stage-discharge relation affected by ice.

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Daily discharge, in second-feet, of Gunnison River near Grand Junction, Colo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	910	1,380	910	795	870	870	2,800	5,260	7,900	2,500	1,040	11
2	910	1,380	950	760	820	870	2,500	5,860	6,220	2,330	1,710	186
3	870	1,280	1,130	700	820	910	2,210	6,540	4,850	2,060	3,440	34
4	830	1,490	1,080	730	820	950	2,210	6,100	4,470	2,060	2,630	45
5	830	1,280	1,080	760	830	990	2,210	6,540	3,930	2,800	2,210	27
6	830	1,280	1,080	730	800	950	2,800	7,420	3,760	2,350	1,490	11
7	830	1,380	1,230	760	830	830	2,800	7,420	3,440	2,210	1,380	11
8	795	1,280	1,540	760	820	830	2,080	7,200	3,760	2,500	1,380	320
9	760	1,280	1,710	730	820	830	1,830	6,760	3,930	2,080	1,130	320
10	760	1,180	1,600	760	910	795	1,280	6,540	4,100	1,710	1,130	275
11	830	1,280	1,490	760	910	760	1,080	6,980	4,470	1,600	1,280	206
12	990	1,280	1,380	760	950	795	1,130	5,890	5,260	1,280	910	245
13	1,040	1,280	1,230	795	950	990	1,280	4,850	5,660	1,280	670	205
14	910	1,230	1,080	830	910	1,490	1,600	5,260	5,260	1,490	580	225
15	870	1,280	990	910	870	1,280	1,950	5,890	5,680	1,980	360	490
16	830	1,280	990	760	910	1,130	1,710	6,540	6,100	2,580	186	380
17	990	1,380	990	760	910	1,080	1,950	7,420	6,100	2,210	137	705
18	1,040	1,280	1,080	760	910	1,130	2,210	8,150	5,680	1,710	152	870
19	990	1,230	1,080	760	870	1,490	2,760	9,180	5,260	1,380	108	610
20	910	1,130	990	870	910	1,830	5,680	9,960	4,850	2,080	108	490
21	1,080	1,280	1,040	870	910	1,830	6,760	10,500	4,470	1,380	104	460
22	1,180	1,230	1,080	870	910	2,080	7,900	10,300	4,280	1,280	88	350
23	1,080	1,280	990	870	870	2,080	8,460	9,960	4,100	910	88	350
24	1,080	1,280	990	870	910	1,830	9,180	9,440	3,760	795	11	300
25	1,230	1,180	950	910	910	1,950	8,920	8,460	3,930	670	11	300
26	1,710	1,280	974	910	830	1,710	8,400	8,400	3,760	520	11	295
27	1,600	1,180	974	910	870	1,600	6,980	9,440	3,120	430	11	295
28	1,280	1,040	950	910	910	1,490	6,100	9,700	2,960	490	11	295
29	1,180	1,080	990	830	.....	1,710	6,260	9,960	2,800	520	11	245
30	1,280	990	990	910	.....	1,950	5,260	10,200	2,800	610	11	270
31	1,280	.....	950	870	.....	1,950	.....	9,960	.....	2,080	11	.....
1919–20												
1	282	1,300	685	938	1,030	910	830	4,130	27,000	9,080	1,510	95
2	260	1,160	706	902	1,060	1,080	950	6,109	25,100	8,530	1,740	85
3	260	1,210	734	902	1,100	1,300	950	7,490	23,000	8,000	1,620	45
4	260	1,300	741	950	1,150	1,160	790	7,240	21,600	9,600	2,240	35
5	260	1,300	734	990	1,190	910	650	8,530	20,000	10,900	2,500	35
6	260	1,260	720	966	1,160	870	615	9,960	19,600	6,770	2,940	125
7	398	1,210	678	934	1,140	870	680	11,500	20,300	6,100	1,990	125
8	355	1,210	615	902	1,140	910	1,120	12,200	21,000	5,820	1,510	170
9	405	1,080	580	870	1,120	910	1,620	14,500	21,000	4,780	1,400	220
10	460	910	620	838	1,120	960	2,500	16,300	21,000	4,270	1,300	240
11	520	790	750	806	1,160	870	3,060	14,200	19,600	3,800	1,400	280
12	615	790	1,080	776	1,210	790	2,340	12,200	17,200	4,110	1,210	220
13	405	790	974	790	1,360	730	1,740	11,500	16,200	3,960	1,620	185
14	520	720	950	790	1,400	660	1,740	13,200	15,900	3,350	870	155
15	580	720	910	790	1,430	580	2,340	15,900	15,900	3,060	720	110
16	650	650	886	830	1,510	660	2,370	12,200	15,200	2,780	580	185
17	650	720	870	844	1,450	550	2,370	12,900	14,200	2,920	1,210	110
18	650	790	854	886	1,620	520	2,340	15,200	12,500	2,780	355	95
19	650	790	854	910	1,680	520	1,510	19,600	10,900	2,780	355	95
20	830	790	854	926	1,740	650	1,300	23,000	9,960	2,500	355	95
21	990	830	870	950	1,800	680	1,380	26,800	9,960	2,500	580	110
22	960	790	870	990	1,860	580	1,200	31,100	9,960	2,370	755	155
23	870	790	854	1,010	1,860	1,030	960	34,600	10,600	2,360	685	615
24	870	720	870	1,030	1,740	1,260	1,030	29,700	10,600	2,110	660	460
25	960	720	886	1,080	1,160	960	910	29,700	9,660	2,110	405	660
26	1,030	720	902	1,030	990	960	1,120	31,100	9,370	2,500	520	760
27	1,210	432	910	1,010	870	910	1,120	30,100	10,600	2,920	202	820
28	1,300	185	934	960	910	910	1,030	27,800	10,900	3,260	220	960
29	1,210	755	942	940	950	790	1,120	27,000	10,300	1,820	220	1,030
30	1,000	685	950	990	.....	720	2,370	27,600	9,660	1,620	220	570
31	1,060	.....	960	1,010	.....	720	.....	27,300	.....	1,510	260	.....

NOTE.—Stage-discharge relation affected by ice Dec. 26–27, 29, 1918, Jan. 28–25, 28, 29, 31, Feb. 1, 9–18, Dec. 1–7, 9–31, 1919, and Jan. 1 to Feb. 23, 1920; discharge ascertained by means of discharge measurements, temperature and gage-height records, and observer's notes.

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Monthly discharge of Gunnison River near Grand Junction, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	1,710	760	1,020	62,700
November	1,490	990	1,250	74,400
December	1,710	910	1,110	68,200
January	910	700	812	49,900
February	950	800	880	48,900
March	2,080	760	1,320	81,200
April	9,180	1,080	3,950	235,000
May	10,800	4,850	7,830	481,000
June	7,960	2,890	4,540	270,000
July	2,960	430	1,660	102,000
August	3,440	11	723	44,500
September	870	11	337	20,100
The year	10,800	11	2,130	1,540,000
1919-20				
October	1,300	260	669	41,100
November	1,300	185	869	51,700
December	1,080	530	825	50,700
January	1,030	776	919	56,500
February	1,860	870	1,310	75,400
March	1,300	530	830	51,000
April	3,060	615	1,460	86,900
May	34,800	4,110	18,800	1,140,000
June	27,000	9,370	15,600	928,000
July	10,960	1,510	4,170	256,000
August	2,500	202	988	60,800
September	1,030	35	305	18,100
The year	34,800	35	3,880	2,820,000

Combined monthly discharge of Gunnison River and Redlands canal, Grand Junction, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	1,710	760	1,020	62,700
November	1,490	990	1,260	74,400
December	1,710	910	1,110	68,200
January	910	700	812	49,900
February	950	800	880	48,900
March	2,080	760	1,320	81,200
April	9,560	1,460	4,310	256,000
May	11,200	5,230	8,220	506,000
June	8,310	3,190	4,910	292,000
July	3,260	840	2,080	126,000
August	3,850	326	1,110	68,200
September	1,200	411	716	42,600
The year	11,200	326	2,320	1,680,000
1919-20				
October	1,300	630	905	55,600
November	1,330	680	1,190	70,800
December	1,200	854	975	60,000
January	1,030	776	919	56,500
February	1,860	870	1,310	75,400
March	1,660	870	1,080	66,400
April	3,450	1,020	1,860	111,000
May	35,200	4,520	18,900	1,160,000
June	27,400	9,780	16,000	952,000
July	11,300	1,920	4,620	284,000
August	2,980	652	1,440	88,500
September	1,460	480	744	44,300
The year	35,200	480	4,170	3,020,000

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EAST RIVER AT ALMONT, COLO.

LOCATION.—In sec. 22, T. 51 N., R. 1 E., at highway bridge at Almont, Gunnison County, 100 feet above junction of East and Taylor rivers.

DRAINAGE AREA.—295 square miles (measured on Forest Service atlas).

RECORDS AVAILABLE.—July 27, 1910, to September 30, 1920. From April 15, to October 8, 1905, a station was maintained at this point, gage being referred to different datum.

GAGE.—Vertical staff on downstream side of right abutment; read by J. W. Brittain.

DISCHARGE MEASUREMENTS.—Made from two-span bridge.

CHANNEL AND CONTROL.—Bed composed of small boulders and coarse gravel. Control shifts during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 2.96 feet May 28 (discharge, 1,780 second-feet); minimum discharge, estimated, 39 second-feet January 2 and 3 (stage-discharge relation affected by ice).

Maximum stage recorded during year ending September 30, 1920, 5.2 feet at 7.30 a. m. June 9 (discharge, 4,220 second-feet); minimum discharge occurred during winter.

1910-1920: Maximum stage recorded, 5.7 feet June 12, 13, and 14, 1918 (discharge, 6,000 second-feet); minimum stage recorded, 0.30 foot August 13, 1913 (discharge, 19 second-feet).

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Court decrees for diversion of 78 second-feet from East River.

REGULATION.—Diurnal fluctuations during spring, caused by alternate melting and freezing of mountain snow.

ACCURACY.—Stage-discharge relation shifted during period April 17 to May 20, 1920; affected by backwater from Taylor River May 26 to June 18, 1920; also affected by ice. Standard rating curve well defined below 2,800 second-feet; indirect method for shifting control used April 17 to May 20 and May 26 to June 18, 1920. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for periods for which shifting-control method was used and periods of ice effect as noted in footnote on tables of daily discharge. Records considered only fair, owing to possible diurnal fluctuation, which probably is the cause of a discrepancy between the discharge of Gunnison River near Gunnison and the combined discharge of East and Taylor rivers at Almont.

COOPERATION.—Gage-height record furnished by United States Bureau of Reclamation.

Discharge measurements of East River at Almont, Colo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft.*	1920		*Feet*	*Sec.-ft.*
Jan. 9	T. J. Watkins	[a] 1.12	47	Jan. 9	T. J. Watkins	[a] 1.25	64
Feb. 21	do		56	Feb. 8	do	[a] 1.18	72
May 21	J. B. Spiegel	2.74	1,530	May 10	Robert Follansbee	2.41	1,320
Nov. 11	T. J. Watkins	.89	94	June 4	Foster and Elliott [c]	[b] 3.88	2,430
				5	do	[b] 4.28	2,940
				July 25	P. V. Hodges	2.11	700

[a] Stage-discharge relation affected by ice.
[b] Stage-discharge relation affected by backwater from Taylor River.
[c] U. S. Bureau of Reclamation engineers.

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Daily discharge, in second-feet, of East River at Almont, Colo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918-19												
1	145	135	100	45	63	53	96	745	962	650	328	120
2	145	135	104	39	62	53	106	745	905	650	348	120
3	145	135	106	39	61	54	108	650	745	745	408	120
4	140	135	106	47	61	54	120	695	695	605	315	120
5	145	135	106	49	62	54	128	850	695	488	279	120
6	151	135	104	49	64	55	151	905	695	450	250	120
7	154	135	100	49	65	56	145	905	745	450	246	120
8	157	135	94	48	67	57	128	850	745	408	250	120
9	163	135	92	47	68	58	135	905	745	348	242	125
10	148	130	91	47	67	60	125	850	850	285	210	125
11	145	130	90	47	65	62	120	745	962	255	208	120
12	145	130	88	48	59	63	122	695	850	255	208	120
13	140	130	88	50	61	63	125	695	850	261	208	120
14	140	120	86	51	65	63	130	850	850	291	196	227
15	140	120	85	53	65	63	125	905	850	273	182	246
16	140	120	85	54	65	63	132	1,020	850	255	169	182
17	140	112	85	56	63	63	145	1,140	850	334	169	169
18	140	112	85	57	60	66	232	1,260	905	303	169	142
19	140	112	85	59	58	71	374	1,360	905	291	160	132
20	140	112	85	60	56	73	450	1,540	905	303	145	122
21	140	110	82	60	56	75	488	1,600	850	250	142	120
22	140	92	80	61	56	75	695	1,650	850	219	140	118
23	140	85	77	62	55	75	795	1,600	795	219	135	116
24	140	80	75	63	54	75	850	1,540	745	196	130	116
25	138	77	73	64	53	75	850	1,480	745	182	130	112
26	135	77	67	65	53	73	745	1,600	745	172	128	108
27	135	80	59	65	52	76	695	1,650	695	169	125	108
28	135	85	52	65	53	79	605	1,710	695	169	120	108
29	135	94	54	65	------	81	605	1,650	695	178	120	108
30	135	100	56	65	------	85	650	1,540	695	189	120	108
31	135	------	53	65	------	96	------	1,250	------	360	120	------
1919-20												
1	108	116	85	------	------	85	85	297	3,390	2,060	605	196
2	108	116	85	------	------	85	88	334	3,540	2,060	566	196
3	108	114	98	------	------	85	85	394	3,120	1,940	695	196
4	120	116	82	------	------	85	85	445	2,880	1,940	650	196
5	130	116	77	------	------	85	85	573	2,760	1,820	650	196
6	130	116	78	------	------	85	85	614	2,880	1,800	665	196
7	130	108	68	------	------	85	88	785	3,390	1,540	488	196
8	130	104	63	------	------	85	85	1,140	3,760	1,310	450	163
9	130	100	60	------	------	85	110	1,310	3,870	1,190	429	163
10	130	97	60	------	------	85	110	1,360	3,390	1,190	429	163
11	125	94	61	------	------	85	110	1,250	2,880	1,140	429	135
12	116	96	63	------	------	85	114	1,080	2,640	1,020	394	135
13	116	98	65	------	------	85	116	1,140	2,880	850	328	134
14	116	100	69	------	------	85	120	1,190	3,000	850	242	135
15	116	104	71	------	------	85	129	1,020	2,880	962	242	135
16	116	110	73	------	------	85	120	962	2,640	850	242	135
17	116	116	75	------	------	85	112	1,080	2,280	695	242	134
18	116	120	75	------	------	85	104	1,600	2,060	695	242	135
19	116	116	75	------	------	85	106	2,900	1,940	650	297	135
20	116	116	75	------	------	85	108	2,230	2,060	745	297	135
21	116	114	77	------	------	85	110	2,760	2,170	695	297	135
22	116	112	77	------	------	85	112	2,640	2,170	605	297	135
23	116	108	77	------	------	85	114	2,280	2,170	565	297	135
24	116	108	76	------	------	85	128	2,280	2,170	565	297	135
25	116	97	75	------	------	85	132	2,880	2,170	905	287	135
26	116	91	75	------	------	85	135	2,880	2,400	905	242	135
27	116	85	75	------	------	85	142	2,400	2,170	695	242	135
28	116	81	75	------	------	85	160	2,520	2,170	695	242	135
29	116	83	77	------	------	85	203	2,760	2,170	605	228	135
30	116	85	80	------	------	85	242	3,390	2,170	565	210	112
31	116	------	77	------	------	85	------	3,700	------	565	200	------

NOTE.—Stage-discharge relation affected by ice Nov. 21, 1918, to Mar. 16, 1919, Nov. 7-17, 1919, and Nov. 27, 1919, to Feb. 29, 1920. Discharge ascertained by means of discharge measurements, temperature, and gage-height records, as follows: Nov. 21, 1918, to Mar. 16, 1919, Nov. 7-17, 25-30, and Dec. 1-31, 1919, as shown in tables; January 1920, 71 second-feet; and February, 1920, 75 second-feet.

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Monthly discharge of East River at Almont, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	163	135	142	8,730
November	135	77	114	6,780
December	106	52	83.6	5,140
January	65	39	54.6	3,360
February	68	52	60.3	3,380
March	96	53	66.7	4,100
April	850	96	339	20,[illegible]
May	1,710	650	1,150	70,700
June	962	695	802	47,700
July	745	160	339	20,[illegible]
August	408	120	196	12,100
September	246	106	130	7,740
The year	1,710	39	291	210,000
1919-20				
October	120	108	118	7,260
November	120	81	105	6,260
December	85	60	73.5	4,520
January	----------	----------	71.0	4,370
February	----------	----------	75.0	4,310
March	85	85	85.0	5,260
April	242	85	117	6,960
May	3,700	297	1,650	101,000
June	3,870	1,940	2,670	159,000
July	2,060	565	1,050	64,600
August	695	200	365	22,400
September	196	112	151	8,960
The year	3,870	----------	545	396,000

TOMICHI CREEK AT SARGENTS, COLO.

LOCATION.—In NW. ¼ sec. 28, T. 48 N., R. 5 E., at railroad bridge three-quarters of a mile west of Sargents, Saguache County. Nearest tributary, Marshall Creek, enters a quarter of a mile above.

DRAINAGE AREA.—165 square miles (measured on Hayden's atlas).

RECORDS AVAILABLE.—May 12, 1917, to September 30, 1920.

GAGE.—Lallie water-stage recorder; installed October 5, 1917, and referred to former vertical staff attached to downstream piling of railroad bridge; read by W. S. Cole.

DISCHARGE MEASUREMENTS.—Made from pile-bent bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel; shifting. Control 30 feet downstream at small rapids of compact gravel; shifts at intervals.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 3.55 feet at 8 a. m. May 29 (discharge, 475 second-feet); minimum discharge probably occurred during winter.

Maximum stage during year ending September 30, 1920, from water-stage recorder, 3.9 feet at 2 p. m. June 1 (discharge, 565 second-feet); minimum discharge probably occurred during winter.

1917-1920: Maximum stage recorded, 4.05 feet at 6 a. m. June 16, 1917 (discharge, 622 second-feet); minimum stage, 1.55 feet on October 8 and 9, 1918 (discharge, 20 second-feet); lower flow probably occurs during winter.

ICE.—Stage-discharge relation seriously affected by ice; observations discontinued.

DIVERSIONS.—A few small ditches divert water for irrigation above Sargents.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow. No artificial regulation.

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ACCURACY.—Stage-discharge relation shifted during high water in 1920; affected by ice for a few days in October and November, 1918. Rating curve used October 1, 1918, to May 21, 1920, well defined below 400 second-feet; curve used June 1 to September 30, 1920, well defined below 200 second-feet; shifting-control method used May 22–31, 1920. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph except for period for which shifting-control method was used and periods noted in footnote to table of daily discharge. Wide control at high water makes station nonsensitive; records good.

Discharge measurements of Tomichi Creek at Sargents, Colo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft.*	1920		*Feet*	*Sec.-ft.*
May 20	J. B. Spiegel	3.25	348	July 21	J. H. Baily *	2.30	72
Sept. 29	Robert Follansbee	1.66	30.8	Aug. 29	F. C. Snyder *	2.04	44.8

* Hydrographer employed by the State.

Daily discharge, in second-feet, of Tomichi Creek at Sargents, Colo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Apr.	May	June	July	Aug.	Sept.
1918-19								
1	34	27	-------	126	300	76	66	35
2	34	27	-------	140	228	83	60	35
3	33	20	-------	126	210	125	60	35
4	31	29	-------	122	204	102	62	35
5	26	29	-------	148	190	83	56	39
6	22	29	-------	156	170	83	49	41
7	28	23	-------	162	166	72	47	46
8	20	24	-------	164	162	66	49	43
9	20	21	-------	168	164	63	52	41
10	24	-------	-------	162	150	61	53	40
11	24	-------	-------	142	150	59	47	43
12	24	-------	53	134	148	66	46	40
13	24	-------	47	144	146	90	42	40
14	24	-------	47	158	130	90	39	46
15	24	-------	43	188	126	76	41	47
16	24	-------	42	201	128	71	42	41
17	28	-------	51	239	126	70	42	40
18	28	-------	64	267	121	67	44	39
19	27	-------	81	298	121	68	41	39
20	28	-------	89	326	112	63	38	36
21	31	-------	89	378	112	58	39	35
22	33	-------	106	378	106	57	43	34
23	33	-------	121	358	110	55	38	32
24	36	-------	132	366	112	55	34	33
25	38	-------	125	350	116	53	35	32
26	30	-------	112	430	101	57	36	32
27	26	-------	107	460	90	58	39	30
28	26	-------	114	465	85	61	36	30
29	26	-------	121	470	80	70	34	30
30	26	-------	117	460	77	74	33	25
31	26	-------	-------	442	-------	71	33	-------

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Daily discharge, in second-feet, of Tomichi Creek at Sargents, Colo., for the years ending Sept. 30, 1919 and 1920—Continued.

Day	Oct.	Nov.	Apr.	May	June	July	Aug.	Sept.
1919–20								
1	24	26		109	559	142	80	32
2	24			112	465	126	66	33
3	24			121	434	127	68	33
4	25			123	424	129	73	33
5	24			156	416	131	67	33
6	24			154	438	119	62	33
7	24			162	460	117	58	32
8	27			158	438	108	48	32
9	25			162	429	104	48	31
10	25			175	411	82	49	31
11	26			160	367	76	47	30
12	24			146	359	74	45	30
13	27			144	318	71	44	29
14	29			144	296	67	48	29
15	30			134	290	68	48	30
16	30			125	279	71	50	30
17	30			126	261	72	49	30
18	27			338	244	64	58	36
19	31			490	227	67	53	30
20	30			495	195	67	57	31
21	28			410	190	68	54	32
22	31			410	175	67	48	29
23	31			398	165	68	53	32
24	32			426	168	65	41	37
25	32			460	172	60	39	30
26	35			470	165	62	39	27
27	39			455	172	62	39	24
28	31		40	430	206	62	37	26
29	34		47	434	158	66	31	25
30	46		86	446	150	59	30	22
31	30			475		62	31	

NOTE.—Stage-discharge relation affected by ice Oct. 28–31, Nov. 1–2, and 4, 1918; discharge interpolated. Recorder not in operation Sept. 5–13, 15, 19, and 20, 1920; discharge interpolated.

Monthly discharge of Tomichi Creek at Sargents, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	38	20	27.5	1,690
November 1–9	29	21	26.4	471
April 12–30	132	42	87.4	3,200
May	470	125	262	16,100
June	309	77	142	8,450
July	125	53	71.2	4,380
August	69	33	45.0	2,770
September	47	25	37.1	2,210
1919–20				
October	46	24	29.0	1,780
May	495	109	276	17,000
June	550	150	301	17,900
July	142	59	83.3	5,120
August	80	30	50.2	3,090
September	37	22	30.1	1,790

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LAKE FORK AT LAKE CITY, COLO.

LOCATION.—In sec. 34, T. 44 N., R. 4 W., at private bridge a third of a mile above Henson Creek, in Lake City, Hinsdale County.

DRAINAGE AREA.—126 square miles (measured on topographic map).

RECORDS AVAILABLE.—April 21, 1918, to September 30, 1920.

GAGE.—Vertical staff fastened to downstream side of right bridge abutment; read by Eugene Otis.

DISCHARGE MEASUREMENTS.—Made by wading or from bridge.

CHANNEL AND CONTROL.—Bed composed of coarse gravel well compacted; fairly permanent. Control at small rapids 250 feet downstream; practically permanent. Banks not subject to overflow except at extremely high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 2.4 feet at 8 a. m. June 17 and 18 (discharge, 780 second-feet); minimum stage, 0.57 foot March 20 (discharge, 10 second-feet).

Maximum stage recorded during year ending September 30, 1920, 2.5 feet at 8 a. m. June 10 (discharge, 900 second-feet); minimum stage, 0.60 foot on March 27, 28, April 3, 5, 6 (discharge, 12 second-feet).

1918–1920: Maximum stage recorded, 2.57 feet at 8 a. m. June 14, 1918 (discharge, 980 second-feet); minimum stage recorded in 1919.

ICE.—Stage-discharge relation seriously affected by ice.

DIVERSIONS.—Practically none which do not return to stream above station. Court decrees for diversion of 22 second-feet from Lake Fork below station.

REGULATION.—Flow naturally regulated by Lake San Cristobal, 4 miles upstream; area 1 square mile. During low water operation of power plant, 1 mile upstream, may influence discharge slightly.

ACCURACY.—Stage-discharge relation practically permanent except as affected by ice. Rating curve well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, except for periods of ice effect. Records excellent, except for periods of ice effect, for which they are fair.

Discharge measurements of Lake Fork at Lake City, Colo., during the years ending Sept. 30, 1919 and 1920.

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
1918				1919			
Oct. 13	Robert Follansbee	0.82	34.1	Nov. 9	T. J. Watkins	0.72	21.8
1919				1920			
Mar. 18	T. J. Watkins	*.70	14.7	Feb. 6	do	*2.32	17.3
May 9	Robert Follansbee	1.50	194	June 11	Robert Follansbee	2.35	753
July 18	do	1.79	272	July 27	P. V. Hodges	1.57	196

* Stage-discharge relation affected by ice.

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Daily discharge, in second-feet, of Lake Fork at Lake City, Colo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918-19										
1	47	29			12	84	470	470	155	55
2	47	29			15	108	330	470	194	53
3	44	28			17	108	280	470	201	51
4	44	27			18	110	261	432	181	50
5	43	28			21	133	261	362	160	48
6	41	30			27	163	280	330	143	44
7	38	31			24	188	330	330	141	44
8	36	29			20	178	362	362	172	45
9	36	27			17	175	362	330	194	47
10	36	28			15	175	470	305	160	50
11	39	27			14	152	560	261	163	50
12	36	26			22	130	612	261	152	52
13	36	27			24	146	560	261	128	52
14	34	26			29	172	612	280	120	55
15	31	26			29	232	722	395	115	78
16	31	29			29	280	722	362	103	76
17	31	28			34	330	780	305	92	74
18	34	24		12	39	432	722	280	86	74
19	34	24		11	44	515	665	280	84	72
20	36	26		10	50	560	665	280	80	69
21	32	27		11	55	612	612	242	76	68
22	34	27		12	72	612	560	214	71	65
23	31	26		12	101	560	560	188	58	55
24	31	26		13	123	480	560	169	52	54
25	31	24		13	130	395	560	158	56	51
26	31	23		14	125	470	470	146	60	50
27	27	23		14	118	560	470	143	65	47
28	31	22		14	90	665	470	136	62	50
29	31	22		13	78	722	470	143	56	50
30	31	22		11	76	722	470	141	58	48
31	29			12		665		136	55	
1919-20										
1	41	28		20	14	21	780	515	173	51
2	47	28		20	14	28	780	560	169	43
3	38	27		20	12	30	722	560	163	38
4	36	28		20	14	39	722	560	160	34
5	36	22		20	12	52	665	515	155	31
6	36	20	20	28	12	115	665	560	141	31
7	36	20	20	27	17	181	722	515	126	32
8	39	20	20	29	18	169	780	470	118	35
9	38	22		31	20	188	780	395	115	33
10	36	24		31	22	214	900	330	113	31
11	36	24		34	22	221	840	280	113	30
12	36	23		34	21	188	780	280	113	28
13	36	22		33	20	191	780	242	103	27
14	38	22		31	20	191	722	242	96	26
15	38	20		27	20	181	711	242	92	24
16	38	20		19	20	152	665	261	86	23
17	36	20		18	22	152	665	261	80	21
18	34	22		17	22	125	612	242	80	20
19	34	20		17	21	178	560	228	74	20
20	34	20		16	17	305	560	228	106	21
21	27	20		15	15	470	612	224	110	20
22	24	20		14	20	515	612	221	106	35
23	24	20		13	20	515	612	210	101	39
24	24	18		15	18	470	612	210	92	45
25	30	18		14	17	560	612	207	78	45
26	29	20		13	16	665	612	207	74	45
27	24	20		12	16	665	560	204	72	44
28	26	23		12	16	665	560	188	69	44
29	24	20		14	16	665	560	181	65	44
30	24	19		16	17	780	560	169	58	44
31	26			15		780		175	57	

NOTE.—Stage-discharge relation affected by ice Nov. 23, 26-30, 1918, Dec. 1, 1918, to Mar. 17, 1919, Nov. 29 to Dec. 5, 1919, and Dec. 9, 1919, to Mar. 13, 1920; discharge not determined for period Dec. 1, 1918, to Mar. 17, 1919; daily discharges estimated for periods Nov. 23, 26-30, 1918, Nov. 29, 30, 1919, and Mar. 1-13, 1920; mean discharge ascertained by means of one discharge measurement, observer's notes, and gage [illegible] and temperature records, as follows: December, 1919, 17 second-feet; January, 1920, 16 second-[illegible]bruary, 1920, 18 second-feet.

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Monthly discharge of Lake Fork at Lake City, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	47	27	35.3	2,170
November	31	22	26.4	1,570
March 18–31	14	10	12.3	342
April	120	12	48.9	2,910
May	722	84	348	21,400
June	780	261	508	30,200
July	470	136	279	17,200
August	201	52	113	6,950
September	78	43	55.1	3,280
1919–20				
October	47	24	33.1	2,040
November	26	18	21.7	1,290
December	----------	----------	17	1,050
January	----------	----------	16	984
February	----------	----------	18	1,040
March	34	12	20.6	1,270
April	22	12	17.7	1,050
May	780	21	312	19,200
June	900	560	677	40,300
July	560	160	313	19,200
August	172	57	105	6,460
September	51	20	33.7	2,010
The year	900	----------	132	95,900

NOTE.—See footnote to table of daily discharge.

HENSON CREEK AT LAKE CITY, COLO.

LOCATION.—In sec. 34, T. 44 N., R. 4 W., at first highway bridge above mouth in Lake City, Hinsdale County. No tributary between station and mouth, a quarter of a mile below.

DRAINAGE AREA.—83 square miles (measured on topographic map).

RECORDS AVAILABLE.—April 21, 1918, to September 30, 1919, when station was discontinued.

GAGE.—Vertical staff fastened to downstream side of right pile abutment; read by S. W. Williams. Datum lowered 0.82 foot October 13, 1918.

DISCHARGE MEASUREMENTS.—Made from single-span bridge or by wading.

CHANNEL AND CONTROL.—Bed of stream composed of coarse gravel overlain with silt tailings from mills upstream; shifts considerably. Control at rapids 75 feet downstream; shifts during high water. Banks not subject to overflow at bridge.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.3 feet at 7 p. m. May 29 (discharge, 944 second-feet); minimum discharge occurred during winter.

1918–19: Maximum discharge recorded, 1,180 second-feet at 6 p. m. June 11, 1918; minimum discharge occurs during winters.

ICE.—Stage-discharge relation seriously affected by ice.

DIVERSIONS.—Practically no diversions which do not return water to creek above station.

REGULATION.—Operation of power plant of Hidden Treasure mine above station causes considerable variation in flow during low water. Storage capacity of reservoir about 735 acre-feet.

ACCURACY.—Stage-discharge relation not permanent; seriously affected by ice. Standard rating curve not well defined. Gage read to quarter-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for period May 29, to September 30, for which it was ascertained by shifting-control method on basis of a comparison with flow of Lake Fork at Lake City. Records fair.

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Discharge measurements of Henson Creek at Lake City, Colo., during the period Oct. 1, 1918, to Nov. 9, 1919

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 13	Robert Follansbee	[a] 0.67	20.0	June 14	Robert Follansbee	3.35	533
Mar. 18	T. J. Watkins	[b] .60	13.2	July 18	do	2.92	216
May 9	Robert Follansbee	1.42	171	Nov. 9	T. J. Watkins	2.30	22.0

[a] New datum. Gage height, referred to old datum, —0.15 foot.
[b] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Henson Creek at Lake City, Colo., for the year ending Sept. 30, 1919

Day	Oct.	Nov.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	44	34		24	128	336	374	181	54
2	38	34		23	131	300	440	210	50
3	32	32		28	140	276	420	190	50
4	37	28		28	210	258	410	170	51
5	32	25		28	207	276	312	164	50
6	30	25		28	201	309	354	154	48
7	30	28		28	195	329	392	149	53
8	32	31		17	184	350	346	144	58
9	34	34		23	170	396	332	149	64
10	37	37		23	162	444	315	156	70
11	30	32		22	138	484	300	152	76
12	30	41		19	138	480	273	142	82
13	27	41		27	142	512	292	154	88
14	25	37		28	210	532	312	147	93
15	112	28		25	258	468	332	142	91
16	25	27		22	255	588	281	131	83
17	27			30	296	576	225	120	84
18	28		13	56	336	504	240	108	73
19	28		15	78	484	488	240	96	68
20	28		17	104	560	476	210	84	62
21	28		18	116	600	492	216	82	56
22	21		19	133	580	492	200	84	54
23	25		19	142	588	509	184	84	50
24	30		20	133	464	504	178	81	50
25	34		21	120	500	508	181	78	54
26	34		22	120	604	520	181	73	50
27	34		23	102	628	504	181	78	48
28	34		23	100	653	488	167	69	42
29	34		23	95	678	472	170	56	41
30	37		25	120	452	456	170	64	37
31	35		34		402		154	56	

NOTE.—Stage-discharge relation affected by ice Nov. 17 to Mar. 27; discharge not determined except for period Mar. 18-27, for which it was ascertained by interpolation based on one discharge measurement. Gage not read Oct. 1, 2, Nov. 7, 8, Apr. 17, 18, May 17, 28, June 19, 27-29, July 13, 14, 22, 26, Aug. 3, 7, 10, 17-19, 24, 31, Sept. 7, 10-13, 19, and 20; discharge estimated or interpolated on basis of a comparison with Lake Fork at Lake City.

Monthly discharge of Henson Creek at Lake City, Colo., for the year ending Sept. 30, 1919

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	112	21	33.9	2,080
November 1-16	42	25	32.5	1,030
March 18-31	34	13	20.9	581
April	142	17	61.5	3,660
May	678	131	343	21,100
June	588	258	447	26,600
July	440	154	270	16,600
August	210	56	121	7,440
September	93	37	60.9	3,620

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CRYSTAL CREEK NEAR MAHER, COLO.

LOCATION.—In sec. 35, T. 50 N., R. 6 W., at old Kruemling ranch, 300 feet above headgate of Fruitland Irrigation Co.'s ditch, 8 miles southeast of Maher, Montrose County. Nearest important tributary, North Fork, enters 1 mile above.

DRAINAGE AREA.—26 square miles (measured on Forest Service atlas.)

RECORDS AVAILABLE.—April 6, 1917, to September 30, 1919, when station was discontinued.

GAGE.—Vertical staff attached to downstream side of left abutment of highway bridge; read by Frank Friand and C. B. Wray.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading

CHANNEL AND CONTROL.—Bed composed of compact gravel; permanent. Control at small rapids of compact gravel, 40 feet downstream; slightly shifting. Banks subject to overflow at stage of 4.0 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.6 feet at 6 p. m. April 22 (discharge, 318 second-feet); minimum stage, 0.25 foot July 13–17, 20–24, 29–31, August 1, 5–31, September 1–12, and 28–30 (discharge, about 2 second-feet).

1917–1919: Maximum stage recorded, 3.2 feet at 8.30 p. m. July 13, 1917 (discharge, 419 second-feet); stream practically dry during part of August, 1918.

ICE.—Stage-discharge relation seriously affected by ice; observations discontinued.

DIVERSIONS.—Above station, Cedar Canyon and Iron Springs ditch has adjudicated decree for 50 second-feet. Below, Fruitland Irrigation Co.'s ditch diverts water into Onion Valley reservoir.

ACCURACY.—Stage-discharge relation not permanent. Rating curve used October 1 to December 14 fairly well defined between 10 and 150 second-feet; curve used March 22 to September 30 well defined above 10 second-feet. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good above 10 second-feet; fair below.

Discharge measurements of Crystal Creek near Maher, Colo., during the year ending Sept. 30, 1919

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
Oct. 23	H. C. Getty	0.49	5.6
May 5	Robert Follansbee	1.70	162

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Daily discharge, in second-feet, of Crystal Creek near Maher, Colo., for the year ending Sept. 30, 1919

Day	Oct.	Nov.	Dec.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	7	8	3	-------	194	137	78	4	2	2
2	6	8	3	-------	49	153	49	4	18	2
3	6	8	3	-------	34	169	54	4	15	2
4	5	10	3	-------	34	161	60	4	6	2
5	5	10	3	-------	34	169	49	4	2	2
6	4	11	3	-------	39	169	44	4	2	2
7	7	8	4	-------	44	169	49	4	2	2
8	6	8	4	-------	39	153	44	4	2	2
9	5	8	3	-------	26	158	78	4	2	2
10	7	8	3	-------	34	137	60	4	2	2
11	6	7	3	-------	34	137	54	4	2	2
12	5	8	3	-------	39	129	60	3	2	2
13	5	8	3	-------	72	137	54	2	2	3
14	5	4	3	-------	72	153	44	2	2	4
15	5	4	-------	-------	85	169	44	2	2	4
16	6	4	-------	-------	129	169	39	2	2	4
17	6	4	-------	-------	169	202	39	2	2	4
18	6	4	-------	-------	177	220	30	3	2	4
19	6	4	-------	-------	177	228	30	3	2	4
20	5	4	-------	-------	169	220	22	2	2	4
21	6	4	-------	-------	229	237	15	2	2	4
22	6	4	-------	54	273	186	15	2	2	4
23	6	4	-------	22	273	169	15	2	2	4
24	6	4	-------	18	237	153	12	2	2	4
25	6	4	-------	30	202	137	9	8	2	4
26	6	4	-------	22	161	137	9	9	2	4
27	4	4	-------	18	188	188	9	9	2	4
28	4	3	-------	12	161	137	6	9	2	2
29	6	3	-------	30	137	129	4	2	2	2
30	6	3	-------	39	129	137	4	3	2	2
31	8	-------	-------	60	-------	129	-------	2	2	-------

NOTE.—No gage-height record Oct. 1–8; discharge interpolated.

Monthly discharge of Crystal Creek near Maher, Colo., for the year ending Sept. 30, 1919

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	8	4	5.7	350
November	11	3	5.8	345
December 1–14	4	3	3.1	26
March 23–31	60	12	30.5	605
April	273	26	120	7,140
May	237	129	168	10,600
June	78	4	36.0	2,140
July	9	2	3.7	228
August	18	2	3.1	191
September	4	2	3.0	179

LEROUX CREEK NEAR LAZEAR, COLO.

LOCATION.—In sec. 33, T. 13 S., R. 93 W., at highway bridge 8 miles north of Lazear, Delta County. No important tributary within several miles.

DRAINAGE AREA.—52 square miles (measured on Forest Service atlas).

RECORDS AVAILABLE.—May 15, 1917, to September 30, 1920.

GAGE.—Lallie water-stage recorder; installed April 23, 1918, and referred to former vertical staff fastened to face of left bridge abutment; inspected by G. H. Henderson and W. F. Stewart. Datum lowered 0.40 foot July 20, 1917, and 0.45 foot October 11, 1917. All gage heights referred to latter datum.

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DISCHARGE MEASUREMENTS.—Made from single-span bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; very rough. Control 50 feet downstream; shifts during high water.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 2.9 feet at 7 p. m. May 19 (discharge, 552 second-feet); stream practically dry during winter.

Maximum stage during year ending September 30, 1920, not known as recorder was not in satisfactory operation during high water; stream practically dry during winter.

1917–1920: Maximum stage recorded, 3.95 feet at 7.30 p. m. June 17, 1917 (discharge, 1,420 second-feet); stream practically dry during winters.

ICE.—No data. Practically the entire flow of stream is stored in reservoirs during winters.

DIVERSIONS.—Court decrees for diversion of 55 second-feet from Leroux Creek above station, of which 33 second-feet is for diversions out of the drainage basin. Below, adjudicated decrees for 290 second-feet.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow. Flow in nonirrigating season stored in reservoirs on headwaters. Decrees for such storage amounts to 606 acre-feet.

ACCURACY.—Stage-discharge relation shifted slightly during winter of 1918–19 and considerably during high water in 1920. Three rating curves used, all fairly well defined below 900 second-feet; applicable October 1 to November 30, 1918, March 23, 1919, to May 23, 1920, and May 28 to September 30, 1920. Operation of water-stage recorder fairly satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspection of recorder graph except as indicated in footnote to table of daily discharge. Records good below 600 second-feet except for periods of missing gage-height record, for which they are fair; records above 600 second-feet, fair.

Discharge measurements of Leroux Creek near Lasear, Colo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
1918				1920			
Oct. 24	H. C. Getty [a]	0.45	2.7	June 8	Robert Follansbee	2.77	863
				July 27	F. C. Snyder [b]	.12	14.9
1919							
May 5	Robert Follansbee	2.12	282				
June 16	do	1.10	33.1				

[a] State division irrigation engineer.
[b] Hydrographer in employ of the State.

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Daily discharge, in second-feet, of Leroux Creek near Lazear, Colo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19										
1	2.8	1.9			12	214	76	18	15	5.0
2	2.7	2.2			16	211	52	19	12	5.4
3	2.6	2.0			20	214	51	23	11	5.8
4	2.6	1.9			28	257	52	33	8.6	4.2
5	2.5	2.0			20	264	50	33	7.4	3.0
6	2.5	2.1			22	274	51	32	6.6	2.9
7	2.4	1.9			23	251	57	39	9.0	4.0
8	2.4	2.2			17	224	57	24	15	3.4
9	2.4	2.2			12	206	50	23	14	3.4
10	2.5	2.2			12	169	49	17	14	3.6
11	2.6	2.1			15	137	49	14	12	3.2
12	4.8	2.0			25	129	44	16	11	3.0
13	2.1	2.0			29	141	39	14	16	4.6
14	2.3	2.0			38	167	38	18	15	5.4
15	2.1	2.2			43	211	40	21	14	6.2
16	2.0	2.0			61	264	39	20	12	4.0
17	1.9	2.0			84	288	35	20	7.0	3.0
18	1.8	2.4			106	308	27	22	2.8	2.9
19	1.6	2.5			114	318	25	25	2.8	3.2
20	1.7	2.2			176	368	23	16	2.6	2.9
21	2.6	2.2			236	311	27	11	2.6	2.9
22	2.5	2.2			372	336	27	9.0	2.3	2.8
23	2.7	2.3		9.0	467	236	28	7.4	2.9	2.6
24	2.5	2.7		5.8	394	211	27	7.8	3.8	2.6
25	2.3	2.8		8.0	288	198	25	7.8	3.6	2.6
26	2.1	2.8		6.2	251	193	23	8.6	4.6	2.6
27	2.1	2.6		4.8	237	179	20	6.6	7.6	2.1
28	2.1	3.2		4.6	184	141	20	7.0	8.2	2.6
29	2.0	3.2		4.8	161	143	19	13	6.2	2.7
30	1.9	3.2		7.4	174	174	18	16	6.6	2.7
31	2.1			12		120		18	4.8	
1919–20										
1	2.8	.8	0.5		5.0	108	826	108	22	9.5
2	2.8	1.1	.4		4.0	130	775	113	25	8.9
3	2.9	1.6	.5		4.0	148	675	125	31	8.6
4	3.0	.9			4.0	150	695	115	32	8.6
5	2.5	1.6			4.0	260	740	90	25	10
6	2.5	1.6			4.0	260	820	67	18	12
7	2.4	1.0			5.0	310	837	53	17	16
8	1.9	1.0			5.0	370	785	45	15	16
9	2.3	.9			5.0	412	750	42	17	19
10	2.3	.9			5.0	377	675	32	22	14
11	2.3	.8		3.4	5.0	299	695	27	20	7.4
12	2.3	1.0		3.8	5.0	242	680	33	16	7.0
13	2.0	1.1		3.4	6.0	264	605	30	14	6.8
14	1.8	1.1		3.4	6.0	343	540	20	14	6.6
15	2.0	.9		4.2	6.0	198	495	29	12	6.2
16	1.9	1.0		4.0	6.0	208	435	34	11	6.0
17	1.8	1.0		3.6	5.0	315	370	33	13	6.2
18	1.7	1.0		3.8	5.0	394	326	32	14	6.4
19	1.7	1.1		4.6	5.0	435	415	32	15	6.4
20	1.6	1.0		6.2	4.0	576	322	31	14	6.8
21	1.6	.9		4.8	4.0	915	239	26	14	7.0
22	1.8	.8		5.4	4.0	998	209	22	18	10
23	2.1	1.0		4.4	4.0	702	158	19	13	9.2
24	1.8	.9		4.0	3.6	650	106	18	11	13
25	1.3	1.0		3.8	3.4	800	106	18	11	15
26	1.0	1.1		3.8	4.4	930	203	25	12	13
27	.8	1.1		4.8	4.6	790	260	14	11	17
28	.8	1.3		4.6	6.6	854	170	17	11	18
29	1.2	1.3		4.7	17	837	132	17	11	12
30	.9	1.0		4.7	55	859	111	17	11	8.3
31	.7			4.8		820		18	10	

NOTE.—Water-stage recorder not operating Oct. 1–7, 1918, May 18, July 30, Aug. 1, and Sept. 14, 1919; discharge interpolated. Recorder not operating and discharge, Mar. 29 to Apr. 23, 1920, ascertained by comparison with flow of Kahnah Creek near Whitewater, and May 4–8 and 24–27, 1920, by comparison with flow of Surface Creek at Cedaredge. Discharge Aug. 3, 1920, is average of half-daily determinations.

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Monthly discharge of Leroux Creek near Lazear, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	9.6	1.6	2.59	159
November	3.4	1.9	2.35	140
March 23–31	12	4.6	6.62	118
April	467	12	121	7,200
May	368	120	221	13,600
June	76	18	37.9	2,260
July	39	6.6	18.4	1,130
August	16	2.3	8.42	518
September	6.2	2.1	3.51	209
1919–20				
October	3.0	.7	1.89	116
November	1.6	.8	1.06	63
March 11–31	6.2	3.4	4.30	179
April	55	3.4	6.82	406
May	998	103	480	29,500
June	837	106	472	28,100
July	125	14	42.3	2,600
August	81	10	17.7	1,090
September	19	6.0	10.4	619

SURFACE CREEK AT CEDAREDGE, COLO.

LOCATION.—About sec. 29, T. 13 S., R. 94 W., at Cedaredge, Delta County. Nearest tributary, Mill Creek, enters 4 miles above.

DRAINAGE AREA.—43 square miles (measured on Forest Service atlas).

RECORDS AVAILABLE.—May 16, 1917, to September 30, 1920.

GAGE.—Stevens water-stage recorder installed July 24, 1919, and referred to vertical staff fastened to right concrete abutment of footbridge, 400 feet upstream from highway bridge in Cedaredge; inspected by J. C. Rock. Lallie water-stage recorder at same site and datum used prior to July 24, 1919.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

CHANNEL AND CONTROL.—Bed composed of small boulders and gravel filled in behind and up flush with crest of old concrete weir, 12 feet below gage, which forms control; shifted slightly during 1920. Above stage 0.7 foot, water flows through an overflow channel which may shift somewhat.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, not known as water-stage recorder was not in operation during high water; minimum stage occurred during winter when stream was practically dry.

Maximum stage during year ending September 30, 1920, from water-stage recorder, 1.95 feet at 7 a. m. May 24 (discharge, 715 second-feet); minimum discharge occurred during winter when stream was practically dry.

1917–1920: Maximum stage occurred in 1920; minimum stage occurs during winter when stream is practically dry.

ICE.—No data. Practically entire flow of stream is stored in reservoirs during winter.

DIVERSIONS.—Court decrees for diversion of 142 second-feet from Surface Creek above station, of which 67 second-feet is for diversion out of the drainage basin. Below, adjudicated decrees for 272 second-feet.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow. Court decrees for storage of 8,140 acre-feet on headwaters of Surface Creek. The storage and release of this water changes the natural flow.

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ACCURACY.—Stage-discharge relation shifted slightly during winter of 1919–20; affected by ice November 24–30, 1918, and November 26–27, 1919. Two rating curves used, both well defined below 400 second-feet, applicable October 1, 1918, to November 25, 1919, and April 25 to September 30, 1920. Operation of water-stage recorder fairly satisfactory except as noted in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspection of recorder graph except as indicated in footnote to table of daily discharge. Records excellent except for periods of missing gage heights and of ice effect, for which they are fair.

Discharge measurements of Surface Creek at Cedaredge, Colo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1918		*Feet*	*Sec.-ft.*	1920		*Feet*	*Sec.-ft.*
Oct. 24	H. C. Getty [a]	0.15	1.5	June 8	Robert Follansbee	1.35	222
1919				July 27	F. C. Snyder [b]	.66	31.8
June 15	Robert Follansbee	.68	44.5	Aug. 25	do	.84	60

[a] State division irrigation engineer.
[b] Hydrographer in employ of the State.

Daily discharge, in second-feet, of Surface Creek at Cedaredge, Colo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Apr.	May	June	July	Aug.	Sept.
1918–19									
1		1.5	2.0		100	56	36	14	20
2		1.6	2.0		82	70	44	14	13
3		1.8	2.0		70	68	36	12	12
4		1.8	2.0		60	67	21	8.7	12
5		1.6	2.0		55	65	25	12	5.5
6		1.8	2.0	5.0	51	45	20	8.0	3.5
7		1.6	2.0	4.0	42	48	33	5.0	10
8		2.4	2.0	3.5	42	48	24	6.0	12
9		2.2	2.0	2.8	48	57	22	6.0	10
10		1.8	2.2	2.8	48	57	19	8.7	11
11		1.4	2.2	3.5	63	48	14	8.7	11
12		1.2	2.4	3.5	48	48	14	10	5.0
13		1.2	2.2	4.0	38	42	12	9.4	6.0
14		1.0	2.4	5.0	39	44	13	6.5	8.7
15		1.0	2.0	5.5	81	43	14	7.0	13
16		1.0		12	89	35	15	12	10
17		1.0		24	74	33	16	19	10
18		1.0		40	70	33	17	19	10
19		1.4		65	60	24	18	19	9.0
20		1.8		89	58	20	20	19	9.0
21		2.0		98	65	28	20	19	8.7
22		2.2		100	63	43	20	19	8.7
23		2.4		130	51	43	20	19	5.5
24		2.4		120	52	58	21	22	4.0
25		2.2		110	48	35	19	26	4.0
26		2.2		105	47	57	19	20	3.5
27		2.0		98	51	54	17	20	4.5
28		2.0		90	57	44	15	17	6.0
29		2.0		92	60	21	15	13	4.5
30		2.0		98	51	25	18	13	3.0
31					47		16	17	

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Daily discharge, in second-feet, of Surface Creek at Cedaredge, Colo., for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Dec.	Apr.	May	June	July	Aug.	Sept.
1919-20									
1	2.8	3.5			42	414	56	15	16
2	2.4	6.0			70	350	49	14	16
3	2.2	2.4			72	328	44	24	21
4	2.8	2.6			66	312	56	52	21
5	2.2	2.6			117	305	59	32	8
6	2.2	2.6			136	305	57	32	11
7	2.2	2.8			178	288	65	32	16
8	2.2	2.8			222	212	46	26	18
9	2.2	3.0			268	201	61	26	20
10	2.2	3.0			191	183	72	32	19
11	2.4	2.8			128	178	87	32	19
12	2.6	2.6			109	183	70	26	19
13	2.6	2.8			127	189	52	32	8
14	2.4	4.0			136	146	76	35	6
15	2.4	2.4			74	127	78	34	6
16	2.4	2.2			80	117	87	35	8
17	2.6	2.4			120	109	89	35	16
18	2.6	2.0			227	99	27	44	16
19	2.6	1.8			422	89	21	46	13
20	2.2	1.4			512	83	36	37	10
21	2.0	1.2			560	84	42	35	5.6
22	2.6	1.2			590	85	52	35	7.6
23	2.2	1.0			508	87	40	33	6.8
24	1.8	1.0			448	88	38	32	6.8
25	2.0	1.0		1.4	580	90	30	61	6.8
26	1.8			1.4	680	92	32	61	6.8
27	2.2			1.4	512	94	29	65	6.8
28	2.8			1.4	522	83	33	59	6.8
29	4.0			1.4	570	68	26	52	5.6
30	3.0			7.2	640	50	22	66	4.8
31	2.2				508		18	44	

NOTE.—No gage-height record Nov. 1-2, Dec. 1-7, 1918, Apr. 16-19, 23-26, 28-30, May 1-5, July 14-19, 27, Sept. 17-20, 1918, June 21-25, July 30-31, Sept. 19-20, 24-25, 1920; discharge ascertained by comparison with flow of Leroux Creek near Lazear or by interpolation. Stage-discharge relation affected by ice Nov. 24-30, 1918, and Nov. 26, 27, 1919; discharge estimated for former period; not determined for latter period. No gage-height record obtained Oct. 1-31, 1918; discharge not determined.

Monthly discharge of Surface Creek at Cedaredge, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
November	2.4	1.0	1.73	103
December 1-15	2.4	2.0	2.00	62
April 6-30	130	2.8	52.4	2,600
May	100	38	58.4	3,590
June	70	20	45.3	2,700
July	44	12	20.9	1,290
August	26	5.0	13.8	848
September	20	3.0	8.44	502
1919-20				
October	4.0	1.8	2.41	148
November 1-29	6.6	1.0	2.44	121
April 25-30	7.2	1.4	2.37	28
May	640	42	302	18,600
June	414	59	166	9,880
July	89	18	49.6	3,050
August	66	14	39.0	2,400
September	21	4.8	11.7	696

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UNCOMPAHGRE RIVER AT OURAY, COLO.

LOCATION.—River: In sec. 31, T. 44 N., R. 7 W., in box canyon a short distance upstream from highway bridge half a mile south of Ouray, Ouray County. Nearest tributary, Canyon Creek, enters 150 feet below; nearest tributary above is Bear Creek.

Power-house flume: In tailrace of power-house flume in Ouray about 100 feet upstream from entrance to river. Water diverted from Uncompahgre River above river station.

DRAINAGE AREA.—44 square miles (measured on topographic map).

RECORDS AVAILABLE.—January 25, 1911, to September 30, 1920, for river station and February 25, 1916, to September 30, 1920, for power-house flume. Combined daily flow for river and flume is given, as intermittent operation of power house causes low-water flow in river to fluctuate to such an extent that one daily gage height does not represent essentially the mean daily stage. From January 7 to March 17, 1908, records were kept at dam of Ouray Electric Light & Power Co., 1 mile south of present station.

GAGE.—River: Stevens water-stage recorder installed April 22, 1919, and referred to vertical staff used since 1911 and attached to rock cliff at left side of stream 150 feet above mouth of Canyon Creek; inspected by T. J. Watkins.

Power-house flume: Vertical staff fastened to side of wooden flume just below power house.

DISCHARGE MEASUREMENTS.—River: Made from footbridge at gage or by wading. Flume: Made from footbridge just below gage.

CHANNEL AND CONTROL.—River: Bed composed of small boulders; rough and shifting. Control short distance downstream, shifting at intervals; station is in box canyon with high vertical walls.

Flume: Control is plank nailed across bottom of flume at lower end. Gage height of crest, 0.9 foot; permanent.

EXTREMES OF DISCHARGE.—River: Maximum stage during year ending September 30, 1919, from water-stage recorder, 3.3 feet at midnight May 29 (discharge, 580 second-feet). Data insufficient to ascertain minimum discharge.

River: Maximum stage during year ending September 30, 1920, 3.65 feet at 10 p. m. June 9 (discharge, 830 second-feet); minimum stage, 0.27 foot, October 17 (discharge, 0.7 second-foot).

1911-1920: Maximum stage recorded, 4.9 feet during night of June 1, 1914, as determined from high-water mark (discharge, 1,400 second-feet); minimum discharge, no flow February 2, 3, and 29, 1912.

ICE.—Stage-discharge relation not affected by ice, as warm springs keep stream open.

DIVERSIONS.—No diversion above station other than pipe line, flow through which is included in these records.

REGULATION.—Diurnal fluctuation during spring from alternate melting and freezing of mountain snow.

ACCURACY.—River: Stage-discharge relation not permanent; not affected by ice during winter. Well-defined rating curve used October 1 to November 30, 1918; two rating curves well defined below 350 second-feet and fairly well defined above 350 second-feet used December 1, 1918, to September 30, 1919, and October 1, 1919, to September 30, 1920, being identical between 2 and 350 second-feet. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspection of recorder graph, except during days of unusual fluctuation in flow when discharge was ascertained by averaging the bi-hourly discharge. Records good below 350 second-feet and fair above.

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Flume: Stage-discharge relation permanent except for one change, exact time of which is uncertain but was assumed to be October 1, 1919; not affected by ice during winter. Shifting-control method used October 1 to November 30, 1918, and October 1–31, 1919. Rating curve well defined. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table except for period June 17 to September 30, 1919, when power house operated only eight hours each day. Records good.

Discharge measurements of Uncompahgre River at Ouray, Colo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
1918				1919			
Dec. 26	T. J. Watkins	0.68	3.9	Aug. 20	T. J. Watkins	1.08	21.1
				Dec. 26	do	.35	1.0
1919							
Apr. 23	do	1.57	132	1920			
June 7	do	2.62	198	June 9	do	2.98	508
14	do	2.46	279				

Discharge measurements of power-house flume at Ouray, Colo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
1918				1920			
Dec. 26	T. J. Watkins	1.15	9.4	Mar. 22	T. J. Watkins	1.50	21.9
1919							
Dec. 26	do	1.40	17.5				

Combined daily discharge, in second-feet, of Uncompahgre River and power-house flume at Ouray, Colo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	28	20	18	14	12	14	19	82	230	212	74	16
2	28	22	18	13	12	15	20	80	187	236	88	16
3	28	20	18	13	12	14	21	86	163	224	74	15
4	28	19	18	13	12	14	21	121	165	199	74	15
5	27	19	18	13	12	14	21	181	187	152	74	15
6	25	19	18	13	10	14	25	194	210	152	74	15
7	24	19	19	12	10	14	25	156	223	199	58	10
8	25	19	17	12	10	14	25	116	236	224	92	11
9	25	19	17	13	13	14	27	123	248	199	66	10
10	25	19	17	16	13	14	27	107	310	141	66	12
11	21	18	17	16	13	14	27	110	378	130	51	12
12	21	18	17	12	14	14	27	105	323	130	44	13
13	21	17	12	12	10	14	27	112	348	120	43	28
14	21	17	17	12	10	14	27	142	396	130	40	66
15	21	17	17	12	11	14	27	196	378	163	38	41
16	21	17	17	12	11	14	27	246	378	120	37	39
17	21	13	17	12	11	14	39	284	344	110	32	30
18	20	19	17	12	15	14	60	321	320	101	28	27
19	20	19	17	12	15	14	77	376	317	101	28	27
20	20	19	17	12	15	14	88	428	304	83	26	26
21	20	18	17	12	14	14	116	428	304	83	18	40
22	20	18	13	12	17	16	142	334	286	74	14	28
23	19	18	12	12	13	15	134	334	286	66	15	22
24	19	18	12	12	13	15	123	296	299	66	16	21
25	19	18	12	12	12	12	114	334	274	74	17	26
26	19	18	12	12	12	12	93	394	224	66	18	20
27	19	18	12	12	12	16	85	466	236	66	16	18
28	19	17	12	12	12	16	82	486	236	58	16	39
29	19	16	12	12	.....	15	73	526	236	74	16	27
30	19	16	13	12	.....	15	74	486	224	58	16	1
31	19	.....	13	12	.....	15	.....	361	.....	58	15	.....

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Combined daily discharge, in second-feet, of Uncompahgre River and power-house flume at Ouray, Colo., for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919-20												
1	18	22	16	19	17	16	22	72	534	307	111	29
2	18	20	17	18	16	16	22	68	506	281	94	28
3	18	24	17	18	16	16	22	78	451	268	102	29
4	24	24	17	18	16	17	22	91	375	258	86	28
5	20	24	17	18	16	19	22	114	355	232	73	38
6	19	24	16	11	16	20	22	126	467	195	68	46
7	20	24	16	11	17	20	24	158	585	182	59	38
8	21	24	16	11	17	20	25	220	621	182	62	40
9	20	24	16	11	17	29	31	251	620	189	100	36
10	20	17	16	11	16	22	30	231	549	189	78	31
11	22	18	16	11	16	22	28	179	408	189	65	35
12	22	18	16	11	16	22	22	172	371	189	59	30
13	21	18	16	16	16	26	25	207	374	170	58	28
14	22	16	16	18	16	26	22	224	351	159	52	27
15	22	16	16	18	16	23	26	150	335	159	49	27
16	21	16	16	20	16	23	23	108	382	159	49	28
17	21	16	16	18	16	22	23	122	292	148	48	27
18	21	16	16	18	17	22	23	180	254	137	49	26
19	22	16	16	20	17	22	23	314	283	137	68	27
20	22	21	16	19	17	32	22	333	299	137	59	32
21	22	16	19	18	16	35	23	427	346	137	55	36
22	22	16	19	22	17	29	23	410	338	126	53	35
23	22	16	19	22	16	23	23	382	322	116	49	47
24	22	16	19	22	16	22	23	467	317	126	42	35
25	22	16	19	22	16	23	24	636	270	116	38	34
26	24	16	19	22	16	22	27	589	295	106	37	30
27	25	16	19	18	16	22	26	500	308	97	36	30
28	18	16	19	19	16	22	26	541	295	97	35	29
29	20	16	19	16	16	22	40	579	295	88	30	31
30	23	16	16	17	-------	22	74	588	285	79	32	28
31	23	-------	16	16	-------	22	-------	690	-------	109	31	-------

Daily discharge, in second-feet, of power-house flume at Ouray, Colo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918-19												
1	23	16	14	8.6	8.6	11	15	26	9.5	3.9	3.9	3.9
2	23	18	14	8.6	8.6	12	15	26	28	3.9	3.9	3.9
3	23	16	14	8.6	8.6	11	16	26	26	3.9	3.9	3.9
4	23	15	14	8.6	8.6	11	16	26	28	3.9	3.9	3.9
5	22	15	14	8.6	8.6	11	16	26	28	3.9	3.9	3.9
6	20	15	14	8.6	6	11	21	26	28	3.9	3.9	3.9
7	20	15	14	8.6	6	11	21	26	28	3.9	3.9	3.9
8	20	15	13	8.6	6	11	21	26	28	3.9	3.9	3.9
9	20	15	13	8.6	8.6	11	23	26	28	3.9	3.9	3.9
10	20	15	13	12	8.6	11	23	26	28	3.9	3.9	3.9
11	16	14	13	12	8.6	11	23	26	28	3.9	3.9	3.9
12	16	14	13	8.6	8.6	11	23	26	28	3.9	3.9	3.9
13	16	13	8.6	8.6	6	11	23	26	28	3.9	3.9	3.9
14	16	13	13	8.6	6	11	23	26	28	3.9	3.9	3.9
15	0	13	13	8.6	6	11	23	26	28	3.9	3.9	3.9
16	0	13	13	8.6	6	11	23	26	28	3.9	3.9	6
17	16	8.6	13	8.6	6	11	23	26	9.3	3.9	3.9	6
18	16	15	13	8.6	8.6	11	23	26	0	3.9	3.9	6
19	16	15	13	8.6	8.6	11	23	26	9.3	3.9	3.9	6
20	16	15	13	8.6	8.6	11	24	26	9.3	3.9	3.9	6
21	16	14	13	8.6	8.6	11	26	26	9.3	3.9	3.9	6
22	16	14	8.6	8.6	0	12	26	26	3.9	3.9	3.9	6
23	15	14	8.6	8.6	8.6	12	26	26	3.9	3.9	3.9	6
24	15	14	8.6	8.6	8.6	12	26	26	3.9	3.9	3.9	6
25	15	14	8.6	8.6	8.6	8.6	26	26	3.9	3.9	3.9	6
26	15	14	8.6	8.6	8.6	8.6	26	26	3.9	3.9	3.9	6
27	15	14	8.6	8.6	8.6	12	26	26	3.9	3.9	3.9	6
28	15	13	8.6	8.6	8.6	12	26	26	3.9	3.9	3.9	6
29	15	12	8.6	8.6	-------	11	26	26	3.9	3.9	3.9	6
-------	15	11	8.6	8.6	-------	11	26	26	3.9	3.9	3.9	6
-------	15	-------	8.6	8.6	-------	11	-------	26	-------	3.9	3.9	-------

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Daily discharge, in second-feet, of power-house flume at Ouray, Colo., for the years ending Sept. 30, 1919 and 1920—Continued

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919-20												
1	6	14	15	17	15	15	21	24	24	-------	32	24
2	6	15	15	17	15	15	21	24	24	-------	32	24
3	6	23	15	17	15	15	21	24	-------	-------	32	24
4	6	23	15	17	15	16	21	24	-------	-------	32	24
5	6	23	15	17	15	18	21	24	-------	-------	32	24
6	10	23	15	10	15	18	21	24	-------	-------	32	24
7	19	23	15	10	15	18	21	24	-------	-------	24	24
8	19	23	15	10	15	18	21	24	-------	-------	24	24
9	19	23	15	10	15	21	21	24	-------	-------	24	24
10	19	15	15	10	15	21	21	24	-------	-------	24	24
11	20	15	15	10	15	21	21	24	-------	-------	24	24
12	20	15	15	10	15	21	21	24	-------	-------	24	24
13	20	15	15	15	15	21	21	24	-------	-------	24	24
14	20	15	15	17	15	21	21	24	-------	-------	24	24
15	20	15	15	17	15	21	21	24	-------	-------	24	24
16	20	15	15	17	15	21	21	24	-------	-------	24	24
17	20	15	15	17	15	21	21	24	-------	-------	24	24
18	20	15	15	17	15	21	21	24	-------	-------	24	24
19	21	15	15	17	15	21	21	24	-------	-------	24	24
20	21	15	15	17	15	21	21	24	-------	-------	24	24
21	21	15	18	17	15	21	21	24	-------	-------	24	24
22	21	15	18	21	15	21	21	24	-------	-------	24	24
23	21	15	18	21	15	21	21	24	-------	-------	24	24
24	21	15	18	21	15	21	21	24	-------	-------	24	24
25	21	15	18	21	15	21	21	24	-------	-------	24	24
26	21	15	18	21	15	21	24	24	-------	-------	24	24
27	22	15	18	17	15	21	24	24	-------	-------	24	24
28	13	15	18	17	15	21	24	24	-------	-------	24	24
29	17	15	18	15	15	21	24	24	-------	-------	24	24
30	22	15	15	15	-------	21	24	24	-------	-------	24	24
31	22	-------	15	15	-------	21	-------	24	-------	21	24	-------

NOTE.—No flow in flume June 3, 1920, to July 30, 1920.

Combined monthly discharge of Uncompahgre River and power-house flume at Ouray, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	28	19	22.0	1,350
November	22	13	18.1	1,080
December	19	12	15.6	959
January	16	12	12.5	769
February	17	10	12.4	689
March	16	12	14.3	879
April	142	19	54.4	3,300
May	526	80	258	15,900
June	896	163	275	16,400
July	236	58	125	7,690
August	92	14	41.8	2,540
September	66	10	22.5	1,340
The year	896	10	73.0	53,600
1919-20				
October	25	18	21.2	1,300
November	24	16	18.6	1,110
December	19	16	17.0	1,050
January	22	11	17.1	1,050
February	17	16	16.8	933
March	35	16	22.4	1,380
April	74	22	26.2	1,560
May	636	66	295	18,100
June	621	254	384	22,800
July	367	79	159	9,780
August	111	31	59.2	3,640
September	47	26	32.1	1,910
The year	636	11	89.1	64,600

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Monthly discharge of power-house flume at Ouray, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	23	0	16.4	1,010
November	18	8.6	14.1	839
December	14	8.6	11.7	719
January	12	8.6	8.82	542
February	8.6	0	7.55	419
March	12	8.6	11.0	676
April	26	15	22.6	1,340
May	26	26	26.0	1,600
June	28	0	16.7	994
July	3.9	3.9	3.90	240
August	3.9	3.9	3.90	240
September	6.0	3.9	4.95	295
The year	28	0	12.3	8,910
1919–20				
October	22	6	17.4	1,070
November	23	14	16.8	1,000
December	18	15	15.9	978
January	21	10	15.8	972
February	15	15	15.0	863
March	21	15	19.9	1,220
April	24	21	21.5	1,280
May	24	24	24.0	1,480
June	24	0	1.60	95.2
July	21	0	.700	43.0
August	33	24	2.55	1,570
September	24	24	24.0	1,430
The year	33	0	16.5	12,000

UNCOMPAHGRE RIVER BELOW OURAY, COLO.

LOCATION.—In sec. 30, T. 44 N., R. 7 W. New Mexico principal meridian, near lowest bridge in Ouray, Ouray County, a third of a mile below railroad station; below all tributaries in Ouray.

DRAINAGE AREA.—76 square miles (measured on topographic map).

RECORDS AVAILABLE.—May 12, 1913, to September 30, 1920.

GAGE.—Gurley water-stage recorder installed March 28, 1917, referred to vertical staff, attached to rock cliff, 500 feet above bridge; used since March 22, 1916; inspected by T. J. Watkins. Original gage, vertical staff attached to downstream side of right bridge abutment, was used prior to March 22, 6.

DISCHARGE MEASUREMENTS.—Made from single-span bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of coarse gravel and small boulders; somewhat shifting. Control is broken rock ledge 50 feet downstream; mill tailings are alternately deposited and scoured out. Banks not subject to overflow except at extreme high-water stage of 6.5 feet.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 4.05 feet at 10 p. m. June 15 (discharge, 760 second-feet); minimum stage, 0.95 foot at 9 a. m. February 26 (discharge, 26 second-feet).

Maximum stage during year ending September 30, 1920, 5.1 feet at 10 p. m. June 9 (discharge, 1,210 second-feet); minimum stage, 1.15 feet at 10 a. m. March 4 (discharge, 14 second-feet).

1913–1920: Maximum discharge recorded, 2,530 second-feet at 1 a. m. June 14, 1918; minimum discharge, 10 second-feet at 9 a. m. February 5 and 6, 1915.

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ICE.—Stage-discharge relation not affected by ice; warm springs keep river open.

DIVERSIONS.—All diversions returned to river above station except one of 5.2 second-feet from Oak Creek.

REGULATIONS.—Diurnal fluctuation during spring caused by alternate melting and freezing of mountain snow. No artificial regulation.

ACCURACY.—Stage-discharge relation not permanent. Two rating curves well defined below 500 second-feet, one from October 1, 1918, to June 4, 1919, and other from June 16, 1919, to September 30, 1920. Shifting-control method used June 5–15, 1919, June 1–20, and August 8 to September 30, 1920. Operation of water-stage recorder satisfactory throughout year. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspection of recorder graph. Records good.

Discharge measurements of Uncompahgre River below Ouray, Colo., during the years ending Sept. 30, 1919 and 1920

[Made by T. J. Watkins]

Date	Gage height	Discharge	Date	Gage height	Discharge
1918	*Feet*	*Sec.-ft.*	1919	*Feet*	*Sec.-ft.*
Dec. 26	1.18	33.4	Dec. 26	1.42	29.5
1919			1920		
June 7	2.86	327	June 9	4.30	774
Aug. 20	1.84	70	June 17	3.85	633

Daily discharge, in second-feet, of Uncompahgre River below Ouray, Colo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	53	60	37	33	33	33	46	147	343	432	123	51
2	51	55	36	33	32	32	47	143	267	478	135	50
3	50	51	39	33	31	32	47	129	235	410	160	43
4	50	49	40	33	31	32	49	169	228	352	145	32
5	47	45	40	33	32	31	54	252	300	282	123	34
6	50	43	41	33	32	31	55	285	368	294	117	34
7	50	42	41	33	32	31	46	242	354	432	122	34
8	47	37	39	33	32	31	43	209	385	390	134	33
9	48	40	37	33	30	32	39	190	405	352	126	24
10	50	45	35	33	32	32	40	176	470	318	120	26
11	47	45	35	33	31	32	47	171	560	250	112	27
12	46	45	38	33	30	33	45	167	560	240	102	24
13	46	43	34	33	29	34	48	180	560	276	90	41
14	49	45	35	32	29	33	51	235	610	294	82	111
15	47	43	37	32	31	32	54	300	635	394	76	98
16	43	40	37	33	31	32	60	385	635	300	76	84
17	47	39	37	32	33	32	83	492	590	282	75	69
18	45	45	35	33	32	34	118	538	568	270	75	55
19	42	45	35	33	31	39	139	685	545	252	75	56
20	42	43	35	33	31	36	162	635	522	210	67	54
21	43	41	33	33	34	40	192	585	478	189	61	46
22	43	40	34	32	30	37	245	538	500	163	58	44
23	42	39	35	32	31	34	261	515	478	159	58	37
24	42	44	33	33	31	34	235	448	545	153	57	37
25	42	42	33	32	31	34	202	448	522	153	57	41
26	43	40	33	33	31	35	165	492	432	155	61	41
27	41	38	33	32	30	36	143	610	455	159	57	40
28	42	39	34	32	31	38	134	595	455	151	55	34
29	45	39	33	31	.....	39	128	635	432	149	51	40
30	51	37	34	32	.....	61	134	585	410	155	48	37
31	58	.....	33	33	.....	54	.....	405	.....	135	46	.....

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Daily discharge, in second-feet, of Uncompahgre River below Ouray, Colo., for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919-20												
1	35	36	31	25	32	27	27	96	805	730	169	65
2	27	41	32	28	32	27	27	87	830	755	159	64
3	29	41	33	29	29	22	27	105	730	658	181	62
4	28	39	32	31	32	24	27	126	635	680	185	61
5	29	40	32	31	29	26	30	155	680	635	161	75
6	32	38	29	29	29	30	29	177	780	582	147	86
7	32	37	27	27	28	28	34	200	962	478	130	74
8	36	38	26	24	28	29	41	280	962	455	147	82
9	28	38	28	26	26	31	55	326	962	410	225	71
10	34	39	26	28	27	28	43	276	990	382	280	64
11	35	41	28	27	26	28	32	202	805	318	179	63
12	41	39	29	27	24	20	30	193	755	318	162	66
13	39	38	26	26	27	31	35	269	830	352	139	64
14	37	41	27	26	26	34	37	262	780	318	130	62
15	41	34	27	27	27	28	39	198	805	318	123	60
16	38	31	27	27	27	28	37	171	855	335	120	60
17	38	32	27	27	26	27	34	181	680	282	114	61
18	37	30	27	26	27	26	30	300	590	268	114	61
19	34	29	27	26	29	33	29	545	680	250	159	60
20	33	31	27	26	32	47	32	612	780	262	137	65
21	32	31	29	25	27	51	32	680	880	270	117	98
22	32	29	29	26	26	40	30	680	830	238	108	74
23	34	30	29	26	28	32	30	590	780	195	99	100
24	33	29	27	26	28	29	29	780	780	209	93	81
25	34	29	26	24	27	29	27	855	635	220	88	74
26	35	29	29	24	24	28	28	830	612	208	87	65
27	34	26	27	26	29	27	27	780	612	195	86	64
28	32	29	26	26	29	24	30	855	658	181	80	65
29	37	30	23	27	30	26	45	880	658	178	75	65
30	37	31	29	30	-------	27	90	962	635	165	71	67
31	34	-------	27	30	-------	29	-------	962	-------	165	68	-------

Monthly discharge of Uncompahgre River below Ouray, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	58	41	46.5	2,860
November	60	37	43.3	2,580
December	41	33	35.8	2,200
January	33	31	32.6	2,000
February	34	29	31.2	1,730
March	61	31	35.4	2,180
April	261	39	104	6,190
May	685	120	373	22,940
June	635	228	452	27,300
July	478	135	265	16,300
August	169	46	88.8	5,460
September	111	24	45.9	2,730
The year	685	24	131	94,600
1919-20				
October	41	27	34.4	2,120
November	41	26	34.2	2,040
December	33	23	28.2	1,730
January	31	24	26.9	1,650
February	32	24	28.0	1,610
March	51	20	29.5	1,810
April	90	27	34.7	2,060
May	962	87	437	26,900
June	990	500	766	45,600
July	755	165	354	21,800
August	285	68	134	8,240
September	100	60	69.2	4,120
The year	990	20	165	120,000

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UNCOMPAHGRE RIVER AT COLONA, COLO.

Location.—In sec. 17, T. 47 N., R. 8 W., half a mile east of Colona, Ouray County. No important tributary within several miles.

Drainage area.—About 475 square miles (measured by United States Bureau of Reclamation).

Records available.—April 6, 1917, to September 30, 1920.

Gage.—Vertical staff; read by J. M. Stakebake.

Discharge measurements.—Made from suspension footbridge near gage.

Channel and control.—Somewhat shifting.

Extremes of discharge.—No data.

Ice.—No data as station is discontinued during winter.

Diversions.—Only a few small diversions above station.

Cooperation.—Daily-discharge record furnished by United States Bureau of Reclamation; quantities changed slightly to conform to computation rules of the United States Geological Survey.

Daily discharge, in second-feet, of Uncompahgre River at Colona, Colo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Apr.	May	June	July	Aug.	Sept.
1918-19							
1	125	--------	475	462	630	250	40
2	125	--------	460	415	760	285	47
3	120	--------	425	370	760	405	40
4	115	--------	460	327	695	370	40
5	115	--------	630	365	520	285	40
6	115	--------	670	405	487	250	40
7	120	--------	630	405	902	250	60
8	120	--------	487	460	630	405	47
9	115	--------	475	520	630	346	60
10	115	--------	448	543	600	542	60
11	195	--------	365	835	520	346	40
12	120	--------	365	905	460	285	60
13	120	--------	370	835	487	250	78
14	115	--------	460	1,070	695	250	78
15	115	--------	600	1,040	902	250	60
16	120	--------	520	1,100	600	250	180
17	120	--------	600	1,[illegible]	570	226	180
18	120	--------	635	1,300	487	165	147
19	120	--------	760	902	570	210	123
20	120	--------	760	902	460	180	123
21	120	460	760	835	405	140	123
22	120	789	630	760	370	135	110
23	125	705	695	760	346	165	100
24	125	695	570	902	346	100	100
25	115	630	630	835	370	100	100
26	140	820	760	695	260	100	90
27	150	425	905	760	250	60	78
28	150	487	760	695	250	60	78
29	150	405	902	695	327	47	78
30	150	460	835	695	285	47	78
31	150	--------	695	--------	327	47	--------

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Daily discharge, in second-feet, of Uncompahgre River at Colona, Colo., for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Apr.	May	June	July	Aug.	Sept.
1919–20							
1	69	165	342	1,190	1,040	382	121
2	69	102	346	930	1,100	392	114
3	47	102	394	960	990	402	110
4	109	102	410	880	1,000	440	108
5	100	102	510	750	970	402	110
6	100	137	485	1,080	820	373	123
7	90	165	555	1,500	730	350	129
8	100	120	625	1,600	670	330	130
9	100	175	765	960	620	455	130
10	100	210	780	960	560	485	118
11	90	155	570	1,430	515	392	111
12	100	124	550	1,260	508	368	107
13	100	142	640	1,260	520	325	105
14	100	177	930	1,290	508	280	103
15	110	203	785	1,240	498	220	103
16	125	204	635	1,280	520	295	103
17	130	158	680	1,100	537	197	105
18	125	155	910	942	525	180	103
19	125	164	1,100	975	498	260	109
20	125	164	1,260	990	490	300	103
21	110	164	1,390	1,170	498	280	112
22	110	122	1,390	1,200	487	208	140
23	125	129	1,350	1,100	487	197	128
24	110	138	1,260	1,070	537	182	130
25	110	138	1,140	1,010	520	180	157
26	125	133	1,400	990	450	174	143
27	125	122	1,020	1,010	460	170	132
28	125	129	970	1,090	440	160	131
29	110	138	1,180	1,060	409	150	128
30	125	170	1,180	1,040	409	140	123
31	125	--------	1,180	--------	378	131	--------

Monthly discharge of Uncompahgre River at Colona, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	150	115	125	7,690
April 21–30	789	406	558	11,100
May	968	365	606	37,260
June	1,300	327	732	43,600
July	902	250	513	31,500
August	543	47	218	13,400
September	180	40	81.6	4,860
1919–20				
October	150	47	107	6,580
April	210	102	146	8,690
May	1,400	342	861	52,900
June	1,600	750	1,110	66,000
July	1,100	378	605	37,200
August	485	131	279	17,200
September	157	100	119	7,080

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UNCOMPAHGRE RIVER AT MONTROSE, COLO.

LOCATION.—In sec. 31, T. 49 N., R. 9 W., at highway bridge one-fourth mile west of Montrose, Montrose County. Nearest important tributary, Happy Canyon Creek, enters 2 miles below.

DRAINAGE AREA.—565 square miles.

RECORDS AVAILABLE.—April 22, 1903, to September 30, 1920.

GAGE.—Vertical staff attached to bridge; read by L. R. Allen.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Bed composed of sand and gravel; shifts occasionally.

EXTREMES OF DISCHARGE.—No data.

ICE.—Although ice forms along banks during winter, river is not frozen over. Observations, however, are discontinued during winter.

DIVERSIONS.—Uncompahgre River is so over-appropriated that the United States Bureau of Reclamation has constructed a tunnel and canal to divert 1,300 second-feet from Gunnison River into Uncompahgre River above Uncompahgre.

COOPERATION.—Daily discharge furnished by United States Bureau of Reclamation; quantities changed slightly to conform to computation rules of the United States Geological survey.

Daily discharge, in second-feet, of Uncompahgre River at Montrose, Colo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Apr.	May	June	July	Aug.	Sept.
1918-19							
1	70	140	375	405	658	660	245
2	90	130	449	365	782	740	245
3	100	161	532	305	825	730	228
4	110	130	405	470	760	700	228
5	110	208	575	510	615	595	228
6	110	275	552	652	720	575	262
7	110	110	552	575	825	490	285
8	220	110	345	532	532	676	305
9	110	110	170	552	760	635	285
10	110	110	552	595	760	640	262
11	110	110	575	782	635	645	245
12	110	120	510	658	615	605	305
13	110	170	425	658	1,020	552	365
14	110	345	490	470	910	490	531
15	100	150	615	532	1,090	490	492
16	90	133	575	595	802	450	447
17	100	133	676	658	802	425	485
18	110	225	595	575	700	490	385
19	360	386	760	676	676	450	262
20	340	345	760	760	676	470	245
21	285	225	700	825	552	425	285
22	110	285	490	720	825	405	225
23	90	425	615	802	450	405	205
24	90	188	532	825	450	365	188
25	70	188	510	825	425	304	170
26	70	177	635	676	425	304	135
27	70	150	802	700	420	285	95
28	45	255	743	700	425	260	95
29	35	204	783	658	435	260	65
30	15	255	700	658	225	250	55
31	10	------	615	------	470	260	------

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Daily discharge, in second-feet, of Uncompahgre River at Montrose, Colo., for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Apr.	May	June	July	Aug.	Sept.
1919–20							
1	56	27	335	900	860	880	448
2	55	30	370	895	1,070	580	422
3	52	28	405	685	740	602	408
4	95	32	335	712	734	780	388
5	95	32	437	900	730	680	412
6	54	33	533	900	715	577	416
7	54	44	385	1,030	680	560	437
8	54	44	370	1,020	709	602	448
9	54	59	200	900	709	635	457
10	55	91	160	960	715	649	448
11	54	119	150	960	667	660	412
12	54	122	45	900	387	562	397
13	54	124	320	840	630	586	380
14	54	95	505	840	709	497	395
15	95	168	270	840	680	388	361
16	95	175	220	775	910	300	322
17	70	175	197	668	900	487	336
18	54	520	580	543	784	468	347
19	54	148	658	755	734	490	345
20	95	112	595	860	779	580	341
21	95	72	658	940	800	568	355
22	70	35	658	1,060	784	580	347
23	54	30	658	909	657	510	412
24	54	218	658	940	790	526	475
25	54	220	776	980	784	268	496
26	95	220	1,090	880	736	462	472
27	95	267	776	785	638	477	442
28	205	222	840	775	602	495	322
29	295	241	900	608	562	490	382
30	405	282	980	778	576	462	380
31	95	.....	900	.....	576	470	.....

Monthly discharge of Uncompahgre River at Montrose, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	360	10	115	7,070
April	425	110	202	12,000
May	802	170	588	34,300
June	895	305	630	38,500
July	1,090	235	654	40,200
August	740	260	484	29,800
September	881	55	267	15,900
1919–20				
October	495	35	88.4	5,440
April	282	27	119	7,080
May	1,090	45	512	31,500
June	1,020	295	831	49,400
July	1,070	387	713	43,800
August	840	268	535	32,900
September	495	332	404	24,000

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UNCOMPAHGRE RIVER NEAR DELTA, COLO.

LOCATION.—In T. 15 S., on line between Rs. 95 and 96 W., at highway bridge 2 miles south of Delta, Delta County. No tributaries below station and none for several miles above.

DRAINAGE AREA.—1,110 square miles (revised; measured on base map of Colorado, scale 1:500,000).

RECORDS AVAILABLE.—April 29, 1903, to September 30, 1920.

GAGE.—Vertical staff at the present site since November 20, 1906; present datum in use since April 19, 1910. Gage read by Miss Eva Helmick.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Bed composed of silt and gravel. Banks are not subject to overflow. Control shifts at intervals.

EXTREMES OF DISCHARGE.—No data.

ICE.—Although ice forms along banks and slush ice frequently occurs, stage-discharge relation is probably not materially affected thereby; observations discontinued during winter.

DIVERSIONS.—Ditches above station divert normal flow during irrigation season; during this period records represent largely return seepage water.

REGULATION.—None.

COOPERATION.—Daily discharge furnished by United States Bureau of Reclamation, which maintains the station; quantities changed slightly to conform to computation rules of the United States Geological Survey.

Daily discharge, in second-feet, of Uncompahgre River near Delta, Colo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Apr.	May	June	July	Aug.	Sept.
1918-19							
1	167	--------	152	387	140	260	110
2	126	--------	140	140	368	417	112
3	115	--------	140	119	350	672	121
4	50	--------	117	128	226	475	124
5	40	--------	318	142	183	445	106
6	125	--------	165	285	277	428	152
7	78	117	397	154	152	352	152
8	59	63	51	177	305	387	132
9	140	59	89	168	297	451	128
10	146	53	275	210	195	496	113
11	152	25	723	189	165	487	87
12	160	25	672	402	165	392	128
13	156	225	261	158	445	301	152
14	160	365	547	152	345	180	445
15	144	243	315	144	263	119	417
16	280	207	274	152	630	117	417
17	200	171	318	189	365	130	365
18	167	112	260	128	273	152	365
19	174	67	275	155	670	162	340
20	226	243	422	243	365	117	340
21	308	281	397	100	451	138	340
22	250	490	365	370	165	106	326
23	245	432	210	225	177	126	340
24	243	165	210	324	195	113	349
25	220	195	289	375	135	119	326
26	170	180	771	213	140	123	305
27	167	140	555	146	140	119	309
28	170	117	226	213	147	106	267
29	170	112	445	305	225	117	273
30	168	83	197	180	192	110	219
31	125	--------	264	--------	165	140	--------

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Daily discharge, in second-feet, of Uncompahgre River near Delta, Colo., for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Apr.	May	June	July	Aug.	Sept.
1919–20							
1	147	23	485	870	320	105	112
2	140	28	648	757	333	109	110
3	180	37	165	880	333	240	57
4	225	43	730	284	370	505	105
5	260	47	952	300	226	625	118
6	260	44	710	640	118	447	125
7	243	64	817	209	160	505	120
8	275	174	810	289	48	490	124
9	300	135	685	310	69	495	135
10	260	130	555	632	69	742	196
11	173	80	503	240	54	550	141
12	170	53	246	177	54	120	125
13	227	75	440	90	69	280	141
14	235	117	1,350	153	69	290	146
15	360	150	1,710	78	69	118	124
16	345	273	570	110	69	105	125
17	385	174	490	90	69	78	141
18	385	340	695	54	69	120	119
19	360	587	1,170	135	92	112	140
20	325	102	1,330	209	86	150	141
21	297	88	1,410	240	78	110	154
22	340	55	1,660	387	78	210	210
23	355	31	2,000	440	34	135	154
24	410	64	1,570	385	78	160	382
25	382	165	1,480	343	160	110	522
26	277	135	1,430	360	110	112	650
27	318	155	915	772	105	118	695
28	251	75	1,020	430	105	120	570
29	297	73	1,020	387	48	105	625
30	417	138	1,090	337	130	92	625
31	260	-------	970	-------	118	96	-------

Monthly discharge of Uncompahgre River near Delta, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	308	40	164	10,100
April 7–30	490	25	174	8,280
May	771	51	317	19,500
June	402	100	209	12,400
July	670	135	268	16,500
August	672	106	253	15,600
September	445	87	245	14,600
1919–20				
October	417	140	286	17,600
April	587	23	122	7,260
May	2,000	165	956	58,800
June	880	54	353	21,000
July	370	34	122	7,500
August	742	78	244	15,000
September	695	57	238	14,200

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KAHNAH CREEK NEAR WHITEWATER, COLO.

LOCATION.—In sec. 34, T. 12 S., R. 97 W., a quarter of a mile below intake for water supply of Grand Junction and 17 miles east of Whitewater, Mesa County. Nearest tributary, Coal Creek, enters short distance above station.

DRAINAGE AREA.—38 square miles (measured on Forest Service atlas).

RECORDS AVAILABLE.—October 15, 1917, to September 30, 1920.

GAGE.—Vertical staff located at right bank 300 feet above footbridge; read by James Woods.

DISCHARGE MEASUREMENTS.—Made by wading or from cable near gage.

CHANNEL AND CONTROL.—Bed composed of gravel and small boulders; shifting. Control located at riffle of small boulders 75 feet downstream; shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 3.06 feet at 6 p. m. May 20 (discharge, 594 second-feet); minimum stage 0.32 foot at 8 a. m. November 15 (discharge, 2.4 second-feet).

Maximum stage recorded during year ending September 30, 1920, 4.0 feet at 6 p. m. June 5 (discharge, 1,350 second-feet); minimum stage recorded, 0.00 foot at 9 a. m. February 26 (discharge, 0 second-foot).

1918–1920: Maximum and minimum stages occurred in 1920.

ICE.—Stage-discharge relation not affected by ice except for short periods.

DIVERSIONS.—City of Grand Junction diverts an average of 5 second-feet above station for domestic use; maximum diversion, 8 second-feet. Diversion measured by use of Cippoletti weir.

REGULATION.—Diurnal fluctuation in spring from alternate melting and freezing of mountain snow. No artificial regulation.

COMBINED FLOW.—Flow diverted by city intake measured by weir and flow added to that at gaging station to show total flow of creek.

ACCURACY.—Stage-discharge relation changed during 1920. Rating curve used from October 1, 1918, to April 30, 1920, well defined below 350 second-feet; curve used May 1 to June 30, not very well defined; shifting-control method used October 1, 1919, to February 20, May 1–15, and July 1 to September 30, 1920. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for period of ice effect. Records good prior to April 30, 1920, after which they are fair

Discharge measurements of Kahnah Creek near Whitewater, Colo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1918		*Feet*	*Sec.-ft.*	1920		*Feet*	*Sec.-ft.*
Dec. 29	T. J. Watkins	0.54	7.4	Jan. 6	T. J. Watkins	0.58	8.3
				May 21	do	1.85	211
1919				June 9	Robert Follansbee	2.90	692
May 23	J. B. Spiegel	2.17	266	Aug. 19	F. C. Snyder *	1.09	32.9
23	do	2.15	260				
Oct. 23	T. J. Watkins	.65	5.7				

* State hydrographer.

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Daily discharge, in second-feet, of Kahnah Creek near Whitewater, Colo., for the years ending September 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	10	10	11	7.0	4	7	13	62	127	50	37	13
2	10	10	11	7.0	4	7	13	65	102	48	54	13
3	10	10	11	6.4	4	7	13	68	98	48	70	13
4	10	10	11	6.4	4.6	7	13	80	92	48	68	13
5	11	10	11	12	4.6	7	12	89	90	48	61	13
6	11	10	11	5.8	4.9	7	12	104	85	48	51	13
7	11	10	11	5.8	5.2	7	11	123	83	48	44	13
8	11	10	10	5.8	5.5	7	11	134	81	42	41	13
9	11	10	10	4.6	5.8	7.8	11	143	80	42	38	13
10	11	10	10	4.6	6.4	8.2	11	160	78	42	35	13
11	11	10	9.4	4.6	6.4	9.4	11	162	75	38	31	13
12	11	10	9.4	4.6	6.4	10	12	204	73	37	28	13
13	11	10	9.4	4.6	6.4	10	14	252	61	37	27	13
14	11	8	9.4	4.6	6.4	11	17	258	50	37	27	13
15	10	7	9.4	5.5	6.4	11	22	331	46	37	26	13
16	10	10	9.4	4.6	6.4	11	30	345	45	37	24	13
17	10	10	8.6	4.6	6.4	11	44	482	40	37	22	13
18	10	11	8.6	4.6	6.7	9.8	45	514	39	34	21	13
19	10	11	8.6	4.6	7	10	48	538	38	34	18	13
20	10	11	8.6	4.6	7	10	47	550	34	32	16	13
21	11	11	8.6	4	7	10	50	474	32	32	16	13
22	11	11	8.6	4	7	10	52	362	32	32	15	13
23	11	11	8.6	4	7	13	58	366	32	30	14	13
24	11	11	8.6	4	7	13	60	356	32	30	14	13
25	10	11	8.6	4	7	13	58	342	31	30	14	13
26	10	11	8.6	4	7	14	60	328	31	30	13	13
27	11	11	8.6	4	7	14	65	381	31	30	13	13
28	11	11	8.6	4	7	14	63	320	50	30	13	14
29	11	11	8.6	4	-------	15	66	314	50	30	13	14
30	11	11	8.6	4	-------	16	65	317	50	37	13	13
31	10	-------	8.6	4	-------	16	-------	286	-------	37	13	-------
1919–20												
1	11	13	13	7.4	7	9.8	11	54	870	56	33	20
2	11	13	13	7.4	7	9.4	11	71	870	56	31	20
3	11	12	11	7.4	7	10	12	66	990	52	27	17
4	12	13	12	7.4	7	11	12	71	1,050	52	22	16
5	12	13	11	7.8	7	6.7	12	78	1,110	51	20	16
6	12	13	12	8.2	7.4	5.2	13	90	990	51	17	16
7	12	13	12	6.4	7.4	9.4	13	114	870	48	16	15
8	12	12	12	4.9	7.4	9.4	15	101	810	48	24	13
9	12	12	1.5	4.6	6.7	9.8	14	92	580	47	24	13
10	12	13	10	3.8	7	10	15	84	608	47	23	13
11	12	13	10	4.6	7.8	10	15	87	500	48	21	13
12	12	11	11	4.3	9	11	15	111	450	48	21	13
13	12	12	9.4	4.6	9.4	11	15	157	315	51	29	11
14	12	11	8.2	5.5	9.4	10	16	173	260	51	28	9.4
15	12	11	8.2	5.5	9.8	10	16	140	228	50	44	8.6
16	12	11	8.2	6.4	9	9.8	15	124	213	50	44	8.6
17	12	13	9	6.7	11	9.8	14	124	198	49	42	8.6
18	12	12	9	6.1	9.8	9.4	12	131	181	51	42	8.6
19	12	12	9	6.4	9.8	10	12	157	154	50	39	8.2
20	12	13	9	6.7	9.8	9.4	12	198	133	50	35	8.2
21	12	13	8.6	6.4	11	9.8	11	228	118	49	35	9
22	12	11	9	6.4	11	10	11	295	105	47	33	8.6
23	12	12	9	6.7	11	9.8	11	335	101	54	31	8.6
24	12	12	9	6.7	11	9.8	11	475	98	58	28	8.6
25	12	12	8.2	6.4	6.4	10	11	635	97	56	28	8.2
26	12	12	8.2	6.4	4.3	10	12	552	97	49	27	8.6
27	12	13	7.4	6.4	9	9	12	580	80	48	27	7.8
28	13	13	7.8	6.4	9.8	5.2	14	750	65	46	23	7
29	13	12	7.8	6.7	9.8	7.4	20	930	61	42	21	7
30	13	11	7.4	6.7	-------	8.2	39	990	59	39	21	7
31	13	-------	7.4	6.7	-------	8.2	-------	930	-------	36	20	-------

NOTE.—Stage-discharge relation affected by ice Dec. 10–11, discharge estimated.

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Monthly discharge of Kahnah Creek near Whitewater, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	11	10	10.6	652
November	11	7	10.3	613
December	11	8.6	9.43	580
January	12	4	5.04	310
February	7	4	6.09	338
March	16	7	10.4	640
April	66	11	33.6	2,600
May	550	62	271	16,700
June	127	31	59.6	3,550
July	50	30	37.8	2,320
August	70	13	28.7	1,760
September	14	13	13.1	780
The year	550	4	41.7	30,200
1919–20				
October	13	11	12.0	738
November	13	11	12.2	726
December	13	1.5	9.30	572
January	8.2	3.8	6.26	385
February	11	4.3	8.59	494
March	11	5.2	9.31	572
April	39	11	14.1	839
May	990	54	288	17,700
June	1,110	59	409	24,300
July	58	36	49.4	3,040
August	44	16	28.3	1,740
September	20	7.0	11.2	666
The year	1,110	1.5	71.3	51,800

Monthly discharge of Kahnah Creek weir near Whitewater, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	6.0	3.5	4.61	283
November	4.5	3.9	3.96	236
December	4.8	3.5	4.01	247
January	5.4	3.9	4.40	271
February	4.5	3.9	3.99	222
March	4.8	3.2	3.79	233
April	6.7	3.5	5.33	317
May	7.2	6.3	6.69	411
June	7.5	6.3	7.32	436
July	7.5	7.5	7.50	461
August	7.5	7.2	7.46	459
September	7.2	4.2	6.32	376
The year	7.5	3.2	5.46	3,950
1919–20				
October	5.7	5.2	5.26	323
November	5.2	4.5	4.69	279
December	6.0	4.5	4.91	302
January	5.2	5.2	5.20	320
February	5.2	3.2	5.06	291
March	5.2	4.5	5.12	315
April	6.0	5.2	5.50	327
May	7.5	5.1	6.65	409
June	8.0	5.2	7.43	442
July	8.0	7.2	7.62	469
August	7.9	6.7	7.38	454
September	7.5	6.0	6.42	382
The year	8.0	3.2	5.94	4,310

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Combined monthly discharge of Kahnah Creek and weir near Whitewater, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	17	14	15.2	935
November	16	12	14.2	845
December	15	12	13.4	824
January	16	7.9	9.44	580
February	12	7.9	10.1	561
March	20	10	14.2	873
April	73	14	38.9	2,310
May	557	69	278	17,100
June	133	38	66.9	3,980
July	58	38	45.3	2,790
August	78	20	36.2	2,230
September	20	18	19.4	1,150
The year	557	7.9	47.2	34,200
1919–20				
October	18.2	16.7	17.3	1,060
November	18.2	15.5	16.9	1,010
December	17.5	6.0	14.2	873
January	13.4	9.0	11.5	707
February	16.2	7.5	13.6	782
March	16.2	9.7	14.4	885
April	45	16.2	19.6	1,170
May	998	60	295	18,100
June	1,120	66.5	416	24,800
July	65.5	44	57.0	3,500
August	51.5	22.7	35.7	2,200
September	27.5	13	17.6	1,050
The year	1,120	6.0	77.3	56,100

DOLORES RIVER AT RICO, COLO.

LOCATION.—In sec. 36, T. 40 N., R. 11 W., at highway bridge at upper edge of Rico, Dolores County. Silver Creek enters just above station.

DRAINAGE AREA.—83 square miles (measured on topographic map).

RECORDS AVAILABLE.—June 9 to December 31, 1914; June 1, 1919, to September 30, 1920.

GAGE.—Vertical staff fastened to right abutment used during 1914 and until August 12, 1919. On August 14, 1919, a chain gage, referred to datum 1.84 feet lower, was installed on bridge; read by G. E. Hicks.

DISCHARGE MEASUREMENTS.—Made from single-span bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of small boulders; may shift. Control 175 feet downstream at rapids composed of well-compacted boulders; shifting during extremely high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period June 1, 1919, to September 30, 1919, 3.55 feet (new datum) at 6 p. m. June 13 (discharge, 411 second-feet); minimum stage, 1.48 feet at 8 a. m. September 29 and 30 (discharge, 35 second-feet).

Maximum stage recorded during year ending September 30, 1920, 5.85 feet at 6 p. m. May 25 (discharge, 1,130 second-feet); minimum stage, 1.05 feet at 8 a. m. November 8 (discharge, 10 second-feet).

ICE.—Stage-discharge relation slightly affected by ice for short periods.

DIVERSIONS.—The Syndicate Mining Co. diverts about 2 second-feet from Horse Creek, a tributary of Dolores River, and carries it to a pressure pipe located several hundred yards below gage. Water is diverted from April to November. The flow through the pipe line varies between 1.7 and 3.0 second-feet, but this does not include the entire amount diverted, as considerable is wasted over a spillway just below gage. No other diversions above station.

REGULATION.—None.

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ACCURACY.—Stage-discharge relation shifted during 1920. Rating curves used from June 1, 1919, to May 26, 1920, and from June 1 to September 30, 1920, well defined below 400 second-feet; indirect method for shifting control used May 27–31, 1920. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good below 400 second-feet and fair above.

COOPERATION.—Gage-height record furnished by Syndicate Mining Co.

Discharge measurements of Dolores River at Rico, Colo., during the period June 1, 1919, to Sept. 30, 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft.*	1920		*Feet*	*Sec.-ft.*
June 4	T. J. Watkins	1.08	311	Jan. 27	T. J. Watkins	1.28	18.2
Aug. 14	do	[a]—.06	68	May 12	do	3.08	300
Sept. 26	Robert Follansbee	1.53	38.1	July 17	do	2.34	175
Dec. 16	T. J. Watkins	[b]1.66	21.5				

[a] New gage read, 1.78 feet. [b] Stage-discharge relation affected by ice.

Discharge measurements of Power house tailrace at Rico, Colo., during the period June 1, 1919, to Sept. 30, 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft.*	1920		*Feet*	*Sec.-ft.*
Aug. 14	T. J. Watkins		3.2	Jan. 27	T. J. Watkins	1.00	1.6
Sept. 26	Robert Follansbee		[a]2.9	May 12	do	.95	1.7
Dec. 16	T. J. Watkins	0.95	1.8	July 17	do	1.10	1.7

[a] Float measurement.

Daily discharge, in second-feet, of Dolores River at Rico, Colo., for the period June 1, 1919, to Sept. 30, 1920.

Day	June	July	Aug.	Sept.	Day	June	July	Aug.	Sept.
1919					1919				
1	275	171	157	42	16	363	235	60	39
2	260	162	167	40	17	345	227	58	37
3	260	157	157	40	18	319	215	75	38
4	275	150	162	40	19	297	207	66	38
5	326	139	150	42	20	279	187	56	38
6	328	136	119	41	21	264	187	49	37
7	323	136	111	40	22	235	187	45	37
8	301	129	106	39	23	235	175	44	37
9	315	116	106	38	24	231	175	44	37
10	319	106	91	36	25	229	157	42	37
11	363	111	84	35	26	207	157	40	37
12	367	119	77	40	27	181	157	40	38
13	372	157	66	46	28	178	157	42	38
14	381	167	62	41	29	179	144	42	36
15	345	215	58	40	30	167	144	42	37
					31		150	41	

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Daily discharge, in second-feet, of Dolores River at Rico, Colo., for the year ending Sept. 30, 1920

Day	Oct.	Nov.	Dec.	Jan	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919–20												
1	38	36	30	28	21	16	21	199	1,000	471	106	40
2	38	30	25	24	21	16	21	190	900	428	106	39
3	38	27	25	23	21	14	22	252	870	366	110	39
4	39	26	25	20	21	14	22	296	855	306	115	40
5	38	28	25	20	16	19	28	285	825	267	108	38
6	37	25	24	19	21	16	22	308	765	230	108	36
7	41	23	24	19	24	16	24	368	780	177	105	35
8	37	19	24	18	22	17	27	442	735	175	105	34
9	39	19	23	17	20	16	30	290	705	161	105	34
10	39	21	23	17	21	16	30	308	705	155	103	32
11	37	22	23	17	21	17	28	308	675	175	102	32
12	37	22	23	17	24	18	29	320	660	165	102	34
13	37	21	24	17	20	16	31	355	630	143	102	46
14	37	23	25	16	17	18	31	368	630	136	103	46
15	39	23	22	16	18	17	30	392	615	136	98	46
16	37	24	18	16	18	18	28	418	630	149	85	41
17	37	24	19	16	19	17	25	455	630	142	80	41
18	37	25	23	19	18	19	26	515	615	134	73	41
19	38	25	22	20	17	19	27	710	609	134	59	37
20	39	22	24	19	16	21	27	725	600	134	58	35
21	38	22	24	19	16	18	28	740	600	123	54	34
22	38	22	24	20	15	24	27	995	600	153	53	32
23	38	22	28	20	15	19	27	965	585	129	50	29
24	35	22	22	20	16	19	25	1,060	585	126	52	28
25	35	24	23	19	16	19	37	1,060	585	113	48	28
26	38	24	24	18	17	21	46	1,010	630	113	46	29
27	37	21	24	22	18	19	51	1,010	600	110	45	29
28	37	22	24	20	16	17	62	1,010	630	109	44	30
29	38	22	22	24	15	17	99	995	570	109	41	29
30	37	27	22	22	-------	18	113	935	525	109	41	29
31	36	-------	24	22	-------	21	-------	985	-------	116	40	-------

NOTE.—Gage not read September 7–13, 1919; discharge ascertained from a study of precipitation records. Stage-discharge relation affected by ice Nov. 9–16, 22, Dec. 9–17, 24–25, 1919, Jan. 3, 9–11, Feb. 20, Mar. 4, 17, 27–30, Apr. 14–17, 1920; discharge ascertained from study of discharge measurements, daily gage-height, temperature records, and observer's notes. Discharge June 1–3, 1919, estimated.

Monthly discharge of Dolores River at Rico, Colo., for the period June 1, 1919, to Sept. 30, 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
June	381	167	284	16,900
July	235	106	162	9,960
August	167	40	79.3	4,880
September	46	35	38.7	2,300
The period				34,000
1919–20				
October	41	35	37.6	2,310
November	50	19	24.4	1,450
December	30	18	23.5	1,440
January	28	16	19.5	1,200
February	24	15	18.6	1,070
March	24	14	17.8	1,090
April	113	21	34.8	2,070
May	1,060	190	588	36,200
June	1,000	525	681	40,500
July	471	109	177	10,900
August	115	40	78.8	4,850
September	48	28	35.6	2,120
The year	1,060	14	145	105,000

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DOLORES RIVER AT BEDROCK, COLO.

LOCATION.—In sec. 17, T. 47 N., R. 18 W., at highway bridge at Bedrock, Montrose County. Nearest perennial tributary, West Paradox Creek, enters below station.

DRAINAGE AREA.—1,910 square miles (measured on United States Geological Survey map of Colorado, scale 1:500,000).

RECORDS AVAILABLE.—April 26, 1918, to September 30, 1920.

GAGE.—Chain attached to upstream side of bridge; read by H. S. Dockery.

DISCHARGE MEASUREMENTS.—Made from single-span bridge or by wading.

CHANNEL AND CONTROL.—Bed of stream composed of compact sand and silt, which shifts. Control located at bend of river 500 feet downstream; will shift during high water.

ICE.—Ice forms complete cover; records discontinued during winter.

EXTREMES OF DISCHARGE.—Maximum discharge during year ending September 30, 1919, 2,340 second-feet at 7 a. m. May 24 and 25. Minimum stage recorded −0.3 foot October 1–7 (discharge, 6 second-feet).

Maximum stage recorded during year ending September 30, 1920, 8.6 feet at 5 p. m. May 23 (discharge, 4,040 second-feet); minimum stage, 0.55 foot occurred October 4 and 5 (discharge, 16 second-feet).

1918–1920: Maximum discharge occurred during 1920; minimum stage, −0.3 foot September 27 to October 7, 1918 (discharge, 6 second-feet).

DIVERSIONS.—No decrees for diversion from Dolores River although irrigation is practiced to a considerable extent on headwaters.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Rating curves used from October 1, 1918, to April 21, 1919, and from June 6, 1919, to September 30, 1920, well defined below 3,200 second-feet; shifting control method used April 22 to June 5, 1919. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good below 3,200 second-feet and fair above.

Discharge measurements of Dolores River at Bedrock, Colo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft.*	1920		*Feet*	*Sec.-ft.*
May 7	Robert Follansbee	4.40	2,010	May 13	T. J. Watkins	6.96	3,030
June 7	J. H. Baily [a]	3.31	767	June 6	Robert Follansbee	7.50	3,190
Sept. 24	Robert Follansbee	.83	30.7	July 24	F. C. Snyder [a]	1.60	153
				Sept. 21	do	.64	21.6

[a] State hydrographer.

97418—25†—WSP 509——8

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Daily discharge, in second-feet, of Dolores River at Bedrock, Colo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19									
1	6	25	.....	700	1,630	1,780	145	310	16
2	6	16	.....	820	1,750	1,340	145	176	16
3	6	16	.....	600	1,780	1,080	154	620	14
4	6	25	.....	708	1,690	825	176	530	13
5	6	25	.....	730	1,810	710	165	340	13
6	6	16	.....	935	1,990	688	188	212	13
7	6	25	.....	985	2,080	710	188	165	10
8	16	31	.....	1,110	2,080	642	98	212	10
9	16	37	.....	620	1,810	575	83	200	14
10	16	37	.....	480	1,810	552	98	225	13
11	16	37	.....	428	1,690	552	115	124	11
12	16	37	.....	520	1,510	530	134	95	17
13	16	25	.....	1,190	1,420	598	165	73	35
14	25	25	.....	1,480	1,570	732	200	59	40
15	25	37	.....	1,300	1,780	732	375	53	72
16	25	37	.....	1,240	1,780	778	310	47	188
17	44	44	.....	1,360	1,900	710	530	59	205
18	37	51	.....	1,480	1,930	665	800	73	238
19	25	51	.....	1,600	1,930	598	710	120	94
20	25	44	.....	1,660	1,960	530	1,100	30	86
21	37	37	.....	1,690	1,900	470	710	73	65
22	20	37	.....	1,750	1,990	392	490	66	51
23	16	.....	.....	1,990	1,960	340	340	53	45
24	16	.....	.....	2,140	2,140	325	265	47	34
25	20	.....	.....	2,300	2,110	295	212	41	33
26	20	.....	.....	2,110	2,020	280	165	36	24
27	16	.....	.....	1,990	2,050	280	118	31	24
28	16	.....	.....	1,720	2,210	188	105	23	21
29	16	.....	.....	1,570	2,090	154	89	17	18
30	16	.....	.....	1,570	2,140	165	75	16	18
31	20	.....	.....	.....	2,110	.....	165	16	.....
1919–20									
1	18	98	.....	375	3,480	3,690	1,720	59	22
2	18	124	.....	410	3,480	3,620	1,600	95	22
3	18	115	.....	375	3,340	3,620	1,540	73	22
4	16	106	.....	375	3,270	3,580	1,420	200	22
5	16	98	.....	340	3,200	3,480	1,420	280	22
6	18	115	.....	325	3,270	3,340	1,200	225	36
7	18	115	.....	450	3,270	3,340	1,000	188	94
8	18	115	.....	1,000	3,270	3,410	800	144	65
9	18	115	.....	1,310	3,340	3,410	710	134	51
10	76	115	.....	1,900	3,480	3,340	620	134	51
11	55	115	.....	1,600	3,480	3,200	530	103	30
12	98	115	.....	1,200	3,200	3,130	450	310	22
13	106	98	.....	1,200	2,930	2,930	375	176	22
14	115	83	.....	1,900	3,000	2,930	310	124	17
15	115	83	.....	1,900	3,060	2,540	280	88	17
16	115	83	.....	2,020	2,860	2,540	295	66	17
17	115	83	.....	1,780	2,740	2,540	250	59	17
18	115	83	.....	1,420	2,740	2,280	280	53	17
19	115	83	.....	1,150	3,080	2,080	188	53	17
20	115	98	.....	1,100	3,200	2,020	144	95	58
21	115	83	225	1,050	3,480	2,020	134	47	19
22	115	76	340	950	3,690	2,020	144	41	35
23	98	.....	620	900	4,040	2,150	575	53	22
24	98	.....	575	1,200	3,900	2,080	188	47	19
25	98	.....	450	1,720	3,830	1,960	124	41	19
26	115	.....	450	2,080	3,830	1,780	90	36	19
27	154	.....	530	2,280	3,760	2,280	106	31	17
28	154	.....	490	2,800	3,760	2,670	98	28	45
29	144	.....	450	3,130	3,760	2,540	83	23	45
30	124	.....	375	3,200	3,760	2,020	62	23	51
31	106	.....	375	.....	3,690	.....	49	23	.....

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Monthly discharge of Dolores River at Bedrock, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	44	6	18.0	1,110
November 1-22	51	16	32.5	1,420
April	2,300	428	1,290	76,800
May	2,210	1,420	1,890	116,000
June	1,780	154	607	36,100
July	1,100	75	278	17,100
August	620	16	136	8,360
September	228	10	47.0	2,800
1919-20				
October	154	16	84.5	5,200
November 1-22	124	76	100	4,360
March 21-31	620	225	444	9,680
April	3,200	325	1,380	82,100
May	4,040	2,740	3,390	208,000
June	3,690	1,780	2,750	164,000
July	1,720	49	541	33,300
August	310	23	98.5	6,060
September	94	17	32.7	1,950

SAN MIGUEL RIVER AT NATURITA, COLO.

LOCATION.—In T. 46 N., on line between Rs. 15 and 16 W., at highway bridge in Naturita, Montrose County. Nearest tributary, Basin Creek, enters half a mile downstream.

DRAINAGE AREA.—1,090 square miles (measured on United States Geological Survey map of Colorado, scale 1: 500,000).

RECORDS AVAILABLE.—April 26, 1918, to September 30, 1920.

GAGE.—Chain fastened to upstream side of bridge; read by Mrs. A. R. Payson.

DISCHARGE MEASUREMENTS.—Made from single-span bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of coarse gravel and small boulders and is rough. Control is at rapids 300 feet downstream; shifts during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 4.0 feet at 7 a. m. April 22 (discharge, 2,100 second-feet); minimum stage probably occurred during winter.

Maximum stage recorded during year ending September 30, 1920, 6.0 feet at 6 p. m. May 22 (discharge, 4,300 second-feet); minimum stage, 0.10 foot at 9 a. m. December 10 (discharge, 40 second-feet).

1918–1920: Maximum stage occurred during 1920; minimum discharge probably occurred during winter.

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Court decrees for diversions of 102 second-feet from San Miguel River, of which approximately 84 second-feet is above station.

REGULATION.—Diurnal fluctuation during spring from alternate melting and freezing of mountain snow.

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ACCURACY.—Stage-discharge relation changed during high water in April, 1919; affected by ice during winter. Rating curve used prior to April 18, 1919, not well defined above 700 second-feet, curve used after that date well defined between 80 and 2,500 second-feet. Gage read to quarter-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for period when stage-discharge relation was affected by ice as shown in footnote to table of daily discharge. Shifting-control method used from April 18 to June 6, 1919. Records good.

Discharge measurements of San Miguel River at Naturita, Colo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft.*	1920		*Feet*	*Sec.-ft.*
May 7	Robert Follansbee	2.70	951	Jan. 28	T. J. Watkins	[b] 1.32	118
June 5	J. H. Baily [a]	2.20	546	May 14	do	4.30	2,280
Sept. 25	Robert Follansbee	.52	93	June 6	Robert Follansbee	3.56	1,560
Dec. 18	T. J. Watkins	[b] .90	56	July 24	J. H. Baily [a]	2.23	607
				Sept. 21	F. C. Snyder [a]	.66	113

[a] State hydrographer.
[b] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of San Miguel River at Naturita, Colo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	58	48	76				262	968	772	651		
2	48	47	72				241	1,000	624	685		
3	48	47	83				315	932	602	715		
4	46	52	89				309	953	534	660		
5	47	50	104				384	1,190	574	548		
6	46	50	127				474	1,150	588	472		
7	44	50	187				300	1,070	579	624		
8	50	51	166				227	968	543	656		
9	50	59	104				196	897	502	566		
10	50	58	84				172	1,030	561	489		
11	51	58	76				267	1,000	651	444		
12	50	59	75				445	855	685	502		
13	51	66	76				492	869	720	656		
14	50	77	64				662	890	766	740		
15	50	71	75				535	960	883	755		
16	53	70	87				560	1,000	820	597		190
17	52	58	101				662	1,120	848	574		175
18	50	70	91				968	1,120	814	579		148
19	46	91	93				1,230	1,120	740	784		137
20	50	84	90			212	1,300	1,140	710	570		127
21	48	75	79			288	1,350	1,260	700	432		120
22	52	70	70			203	1,650	1,160	660	372		108
23	48	65	64			164	1,800	1,160	615	348		99
24	42	60	64			187	1,300	968	620	312		99
25	64	55				156	1,260	960	620	280		88
26	42	50				138	1,120	968	570	289		85
27	42	50				142	1,000	1,200	610	265		85
28	42	50				164	960	1,220	606	235		86
29	50	60				180	939	1,150	624	230		86
30	46	74				289	911	1,350	628	225		86
31	46					315		1,080		220		

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Daily discharge, in second-feet, of San Miguel River at Naturita, Colo., for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919-20												
1	85	85	130	69	130	154	114	2,000	2,870	1,300	400	92
2	85	99	106	67	135	172	114	2,210	2,870	1,500	420	68
3	85	106	106	66	139	164	106	2,650	2,430	1,210	480	85
4	85	106	106	73	148	130	114	2,540	2,100	1,040	420	92
5	85	106	114	77	148	128	122	2,540	1,900	1,210	365	440
6	85	92	114	75	152	122	148	2,650	1,700	1,120	312	122
7	99	92	106	73	152	102	215	2,430	2,000	890	280	130
8	99	99	99	66	152	102	312	2,320	2,000	890	265	122
9	99	106	52	61	150	111	400	2,210	2,320	760	480	122
10	99	106	52	58	148	124	615	2,000	1,600	710	615	106
11	106	106	52	54	144	112	365	1,700	1,800	615	440	92
12	106	99	54	56	143	105	382	1,500	1,900	525	348	99
13	99	106	57	58	137	111	330	1,700	1,900	570	280	73
14	99	106	58	63	132	124	480	2,320	1,800	570	240	67
15	114	114	57	68	130	130	480	1,600	1,800	570	215	79
16	114	114	57	75	127	116	525	1,400	1,700	570	190	85
17	114	114	57	5	127	117	420	1,400	1,400	570	202	79
18	114	106	56	99	125	116	302	1,600	1,300	525	168	85
19	9	106	56	110	117	111	252	2,000	1,400	480	190	92
20	2	99	56	125	117	132	252	2,430	1,400	480	240	99
21	85	106	56	135	139	225	252	2,760	1,500	480	202	130
22	85	106	53	135	154	271	168	4,180	1,400	480	179	148
23	85	106	53	135	156	188	215	3,220	1,300	570	158	139
24	85	4	53	132	148	141	312	2,980	1,500	660	139	139
25	85	6	53	130	125	130	330	2,980	1,210	660	130	139
26	85	99	53	128	105	132	312	3,220	1,300	525	130	139
27	85	80	57	127	108	144	348	2,870	1,500	420	122	139
28	85	90	58	118	120	117	525	2,650	1,600	420	122	139
29	67	139	58	117	117	108	1,120	2,650	1,300	365	114	139
30	92	130	63	121	-------	130	2,000	2,870	1,300	330	106	139
31	85	-------	67	122	-------	124	-------	2,870	-------	348	92	-------

NOTE.—Stage-discharge relation affected by ice Nov. 5-7, 21-29, Dec. 12, 22, 23, 1918, Nov. 30, Dec. 3, 4, 6-8, 11-14, 18-21, 31, 1919, Jan. 1 to Feb. 18, 22, 23, 1920; discharge determined from discharge measurements temperature and gage-height records, and observer's notes. No record for winter of 1919 from Dec. 25, 1918, to Mar. 19, 1919, and Aug. 1, 1919, to Sept. 15, 1919. Discharge interpolated Oct. 27, 1918, July 29-31, Nov. 27, 28, Dec. 15-17, and 22-30, 1919.

Monthly discharge of San Miguel River at Naturita, Colo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	64	42	48.8	3,000
November	91	47	60.8	3,620
December 1-24	187	64	91.5	4,360
March 20-31	315	138	203	4,830
April	1,650	172	733	43,600
May	1,350	855	1,060	65,200
June	883	502	659	39,200
July	784	220	499	30,700
September 16-30	190	85	115	3,420
1919-20				
October	114	67	93.1	5,720
November	139	80	105	6,250
December	130	52	70.0	4,300
January	135	54	92.8	5,710
February	156	105	135	7,760
March	271	102	135	8,300
April	2,000	106	388	23,100
May	4,180	1,400	2,400	148,000
June	2,870	1,210	1,740	104,000
July	1,500	330	689	42,400
August	615	92	259	15,900
September	440	67	121	7,200
The year	4,180	52	520	379,000

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MILL CREEK NEAR MOAB, UTAH

LOCATION.—In sec. 8, T. 26 S., R. 22 E., a quarter of a mile above dam, three-quarters of a mile above power plant of Moab Light & Power Co., half a mile below mouth of Dry Fork, 1½ miles above confluence with Pack (Deep) Creek, and 2 miles southeast of Moab, Grand County.

DRAINAGE AREA.—76 square miles.

RECORDS AVAILABLE.—October 24, 1914, to July 15, 1919, when station was discontinued; fragmentary.

GAGE.—Vertical staff on left bank bolted to rock ledge; installed October 25, 1914. A Stevens eight-day water-stage recorder on right bank directly opposite staff gage was used April 2 to July 15, 1919, and was carried away by a flood on August 2, 1919. Vertical staff on left bank was not injured by flood. Recorder inspected by Frank Peterson. Recording gage referred to datum 3.50 feet lower than datum of staff gage which has not been changed since its installation on October 25, 1914.

DISCHARGE MEASUREMENTS.—Made by wading in the vicinity of gage.

CHANNEL AND CONTROL.—Stream bed rocky and banks high. Control is a rock ledge a few feet downstream from gage, shifting at extremely high water.

EXTREMES OF DISCHARGE.—Not determined.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during freshet on May 10; completely changed by flood on August 2. Rating curves poorly defined. Operation of water-stage recorder satisfactory April 2 to July 15, except April 14–19. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection. Mean discharge April 14–19 interpolated. Records fair.

Discharge measurements of Mill Creek near Moab, Utah, during the year ending Sept. 30, 1919

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 24	J. W. Bones	1.18	9.8	Apr. 28	L. W. Jordan	0.89	20.3
Jan. 27	L. W. Jordan	.67	[a] 8.2	June 2	J. W. Bones	.93	28.3
Apr. 2	do	.73	[b] 10.2	Sept. 11	W. E. Dickinson	.45	11.0

[a] Stage-discharge relation affected by ice.
[b] Stage-discharge relation affected by backwater from power dam.

NOTE.—Gage heights are from readings on staff gage.

Daily discharge, in second-feet, of Mill Creek near Moab, Utah, for the year ending Sept. 30, 1919

Day	Apr.	May	June	July	Day	Apr.	May	June	July
1	10	24	34	20	16	19	36	23	-------
2	10	30	32	20	17		35	22	-------
3	11	30	29	20	18		34	24	-------
4	10	31	26	18	19		33	23	-------
5	10	34	23	16	20	28	32	23	-------
6	12	34	23	16	21	37	34	22	-------
7	10	33	23	16	22	35	35	22	-------
8	12	32	24	15	23	34	40	23	-------
9	11	31	23	15	24	33	40	25	-------
10	10	39	23	15	25	31	36	23	-------
11	10	24	23	15	26	28	36	23	-------
12	11	33	26	16	27	25	37	22	-------
13	10	35	23	20	28	21	42	21	-------
14	19	37	22	18	29	20	42	20	-------
15		38	22	16	30	20	42	20	-------
					31	-------	39	-------	-------

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Monthly discharge of Mill Creek near Moab, Utah, for the year ending Sept. 30, 1919

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
April	37	9.4	18.7	1,110
May	42	24	35.1	2,160
June	34	20	23.7	1,410

GREEN RIVER AND TRIBUTARIES

GREEN RIVER NEAR DANIEL, WYO.

LOCATION.—Near line between Tps. 32 and 33 N., R. 110 W., in Fremont County, at highway bridge 6 miles southeast of Daniel, Lincoln County. No large tributary within several miles.

DRAINAGE AREA.—932 square miles (measured on map of United States Geological Survey, scale 1:500,000).

RECORDS AVAILABLE.—April 1, 1915, to September 30, 1920. State engineer maintained station at this point during 1913 and 1914.

GAGE.—Chain gage on downstream side of bridge; read by Mrs. A. P. Sommers.

DISCHARGE MEASUREMENTS.—Made from two-span bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of coarse gravel and small boulders. Control 100 feet downstream at small rapids; shifts slightly. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 4.4 feet at 3 p. m. June 2 (discharge, 2,620 second-feet); minimum discharge probably occurred during winter.

Maximum stage recorded during year ending September 30, 1920, 4.7 feet at 9 a. m. May 16 and 6 p. m. June 11, 12, 14, and 15 (discharge, 3,170 second-feet); minimum discharge probably occurred during winter.

1915–1920: Maximum stage recorded, 7.0 feet at 10 a. m. June 16, 1918 (discharge, 8,750 second-feet); minimum discharge occurred during winter.

ICE.—Stage-discharge relation seriously affected by ice; observations discontinued during winter.

DIVERSIONS.—Prior to July 1, 1919, adjudicated diversions of 241 second-feet from Green River above station.

REGULATION.—None, except natural regulation of Green River lakes.

ACCURACY.—Stage-discharge relation practically permanent except as affected by ice. Rating curve well defined. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table except for periods of ice effect and periods during which gage readings are in error, for which it was ascertained as noted in footnote to table of daily discharge. Records good except for May, 1920, for which they are uncertain owing to doubtful gage heights.

Discharge measurements of Green River near Daniel, Wyo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft.*
June 19	J. B. Spiegel	2.74	551
Sept. 9	P. V. Hodges	2.60	445
1920			
June 16	J. B. Spiegel	4.62	3,020

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Daily discharge, in second-feet, of Green River near Daniel, Wyo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Apr.	May	June	July	Aug.	Sept.
1918–19								
1	320	310	930	930	2,450	360	491	254
2	320	310	1,000	835	2,625	360	498	262
3	330	310	1,030	750	2,280	335	491	278
4	340	310	1,050	670	1,790	330	478	302
5	350	294	1,040	600	1,250	320	465	330
6	360	270	940	635	835	310	454	390
7	385	262	700	530	465	294	443	478
8	410	230	410	465	498	286	432	491
9	465	200	360	465	498	278	421	491
10	530	190	360	465	498	270	410	504
11	498	230	360	465	498	262	400	530
12	465	200	360	465	498	238	385	517
13	517	210	335	438	498	238	370	504
14	438	220	310	410	465	238	360	491
15	410	210	320	385	465	238	350	478
16	410	200	302	465	410	238	340	465
17	421	180	300	530	465	238	340	454
18	438	170	300	600	498	246	330	443
19	454	160	400	670	530	254	320	432
20	438	150	580	710	565	262	310	421
21	410	140	780	835	600	278	302	410
22	385	140	960	1,140	600	294	302	400
23	360	136	1,080	1,260	565	310	294	390
24	350	-------	1,080	1,370	530	340	294	380
25	335	-------	1,250	1,500	530	360	286	370
26	320	-------	1,140	1,370	530	380	286	360
27	310	-------	1,140	1,640	465	410	278	350
28	310	-------	1,030	1,870	438	443	270	340
29	310	-------	1,080	1,950	410	454	262	330
30	310	-------	1,140	2,110	400	465	262	320
31	310	-------	-------	2,280	-------	478	254	-------
1919–20								
1	310	400	-------	530	2,620	1,790	1,500	530
2	302	-------	-------	465	2,280	1,790	1,440	498
3	294	-------	-------	565	1,870	1,790	1,440	465
4	286	-------	-------	600	1,870	1,790	1,370	465
5	278	-------	-------	835	1,870	1,790	1,370	465
6	270	-------	-------	930	1,870	2,280	1,310	465
7	262	-------	-------	1,030	2,240	2,280	1,310	465
8	262	-------	-------	750	2,620	2,280	1,250	465
9	262	-------	-------	1,140	2,800	2,280	1,250	465
10	262	-------	-------	1,250	2,980	2,280	1,190	454
11	262	-------	-------	1,370	2,980	2,280	1,190	454
12	254	-------	-------	1,500	2,980	2,280	1,140	438
13	254	-------	-------	1,640	2,980	2,280	1,140	438
14	254	-------	-------	2,030	2,980	2,280	1,080	438
15	246	-------	-------	2,620	2,980	2,110	1,030	438
16	246	-------	-------	2,980	2,980	2,110	1,030	421
17	238	-------	-------	2,980	2,980	2,110	1,030	421
18	238	-------	-------	2,980	2,980	2,110	980	410
19	200	-------	-------	2,620	2,450	2,110	930	410
20	262	-------	-------	2,620	2,110	2,030	980	410
21	262	-------	-------	2,620	1,790	1,950	980	410
22	286	-------	-------	2,280	1,640	1,950	835	400
23	340	-------	-------	2,450	2,110	1,950	792	380
24	370	-------	-------	2,450	1,870	1,950	750	360
25	443	-------	-------	2,620	1,870	1,870	710	350
26	491	-------	-------	2,280	1,870	1,790	670	340
27	465	-------	-------	2,280	1,790	1,790	600	330
28	454	-------	530	2,110	1,790	1,640	635	330
29	443	-------	410	2,450	1,790	1,640	600	320
30	432	-------	530	2,620	1,790	1,570	600	320
31	422	-------	-------	2,280	-------	1,500	530	-------

NOTE.—Stage-discharge relation affected by ice Nov. 13–22, 1918, and Apr. 1–7, 1919; discharge ascertained by comparison with flow of Green River at Green River, Wyo. Discharge Apr. 17–22, 1919, ascertained by comparison with flow of Green River at Green River, because of error in gage heights. By comparison with flow of adjacent streams, mean discharge for May, 1920, is probably about 25 per cent too high, owing [illegible]s in gage readings.

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Monthly discharge of Green River near Daniel, Wyo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	530	310	387	23,800
November 1-23	310	136	218	9,950
April	1,250	300	734	43,700
May	2,280	385	929	57,100
June	2,620	400	771	45,900
July	478	238	316	19,400
August	498	254	361	22,200
September	530	254	406	24,200
1919-20				
October	491	200	311	19,100
May	2,980	465	1,870	115,000
June	2,980	1,640	2,320	138,000
July	2,280	1,500	1,990	122,000
August	1,500	530	1,020	62,700
September	530	320	419	24,900

GREEN RIVER AT GREEN RIVER, WYO.

LOCATION.—In sec. 22, T. 18 N., R. 107 W., at highway bridge a quarter of a mile south of railroad station at Green River, Sweetwater County. No tributary within several miles.

DRAINAGE AREA.—7,670 square miles (measured on map of United States Geological Survey, scale 1:500,000).

RECORDS AVAILABLE.—May 2, 1895, to October 31, 1906; March 1, 1915, to September 30, 1920.

GAGE.—Chain gage on upstream side of left span; read by W. S. Moorehouse. Vertical staff attached to submerged cribbing on east bank of river near pump house a third of a mile above present location, used from 1895 to 1906. No determined relation between gages.

DISCHARGE MEASUREMENTS.—Made from two-span bridge.

CHANNEL AND CONTROL.—Bed composed of compact gravel and small boulders with sand bar on one side; slightly shifting. During winter of 1919-20 a rock-fill tie boom was erected 1,300 feet downstream, completely changing control. Banks high and not subject to overflow at stages lower than 10.5 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 8.3 feet at 7 p. m. June 1 (discharge, 8,330 second-feet); minimum discharge occurred during winter.

Maximum stage recorded during year ending September 30, 1920, 9.6 feet [3] at 8 a. m. and 8 p. m. June 12 (discharge, 12,300 second-feet); minimum discharge occurred during winter.

1895-1906; 1915-1920: Maximum stage recorded, 12.3 feet at 5 p. m. June 19, 1918 (discharge, 22,200 second-feet); minimum discharge recorded, 250 second-feet, November 13, 1916.

ICE.—Stage-discharge relation seriously affected by ice; observations usually discontinued during winter.

DIVERSIONS.—Prior to July 1, 1919, adjudicated diversions of 221 second-feet from Green River between this station and station near Daniel.

REGULATION.—None.

[3] Corrected for backwater from tie boom.

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ACCURACY.—Stage-discharge relation practically permanent prior to latter part of April, 1920, except as affected by ice. Construction of a tie boom below gage during latter part of April completely changed stage-discharge relation, and the control thus formed was very unstable. Well-defined standard rating curve was used direct from November 3, 1918, to April 21, 1920; shifting-control method used April 22 to September 30, 1920. Gage read to tenths in 1919 and to half-tenths in 1920 once daily. Daily discharge ascertained by applying daily gage height to rating table except for period for which shifting-control method was used and except for periods of ice effect as noted in footnote to table of daily discharge. Records good prior to April 22, 1920; thereafter fair.

COOPERATION.—Gage-height record furnished by United States Weather Bureau.

Discharge measurements of Green River at Green River, Wyo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
1918				1920			
Dec. 21	J. B. Spiegel	[a] 4.35	414	May 16	J. B. Spiegel	[b] 6.48	3,570
				21	do	[b] 7.56	5,710
1919				June 13	do	[b] 10.58	11,100
Feb. 6	P. V. Hodges	[a] 4.50	330	Aug. 3	P. V. Hodges	[b] 6.25	2,150
Mar. 8	do	[a] 4.50	375	Sept. 28	do	[b,c] 5.82	849
Apr. 30	J. B. Spiegel	4.80	1,760				
June 21	do	4.25	1,170				
Sept. 4	P. V. Hodges	3.30	516				

[a] Stage-discharge relation affected by ice.
[b] Stage-discharge relation affected by backwater from tie boom 1,300 feet downstream from gage.
[c] New chain gage was installed Sept. 28, 1920, at Union Pacific pumping station a third of a mile upstream. The gage height for the measurement of Sept. 28, 1920, referred to this new gage, is 1.78 feet. All records prior to Oct. 1, 1920, are referred to old chain gage.

Daily discharge, in second-feet, of Green River at Green River, Wyo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19											
1		1,000			350	1,880	1,640	8,050	890	650	330
2		1,100			350	2,000	1,530	6,710	890	650	330
3		1,120			350	2,000	1,640	5,100	820	590	620
4		1,000			350	2,120	1,530	3,860	820	590	510
5		960			370	2,000	1,530	3,190	690	590	410
6		960		330	370	2,120	1,420	2,640	620	650	460
7		960			370	2,120	1,420	2,250	620	715	510
8		890			375	2,000	1,420	2,000	620	715	750
9		890			390	1,530	1,420	2,000	560	715	560
10		785			410	1,220	1,530	2,000	560	715	560
11		820			410	1,320	1,530	2,000	560	680	560
12		820			410	1,130	1,530	2,000	560	650	560
13		820			435	1,040	1,420	1,880	560	650	560
14		820			435	1,040	1,420	1,760	510	590	560
15		890			435	960	1,530	1,640	460	590	510
16		890			410	960	1,420	1,530	410	535	510
17		785			435	890	1,530	1,420	350	535	510
18		785			460	890	1,760	1,320	350	535	510
19		650			485	890	2,000	1,220	350	460	485
20		650			560	1,130	2,250	1,130	350	460	485
21		620	414		620	1,420	2,640	1,130	350	410	460
22		620			715	1,530	3,520	1,130	350	370	460
23		560			785	2,000	4,030	1,130	350	370	460
24		460			820	2,000	4,370	1,130	350	370	460
25		410			960	2,120	4,540	1,040	350	370	485
26		410			1,130	2,120	4,720	1,040	350	370	485
27		410			1,320	2,000	4,910	1,040	435	370	485
28		410			1,320	1,880	5,100	960	650	330	460
		460			1,320	1,880	4,720	960	650	330	460
		510			1,530	1,760	4,720	890	650	330	460
					1,640		5,100		785	330	

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Daily discharge, in second-feet, of Green River at Green River, Wyo., for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919–20											
1	460	750	-------	-------	680	820	1,220	9,790	5,960	2,200	890
2	460	750	-------	-------	680	820	1,320	9,190	6,200	2,160	890
3	460	750	-------	-------	680	820	1,530	8,050	5,960	2,120	890
4	510	820	-------	-------	680	820	1,760	5,960	5,960	2,000	890
5	820	890	-------	-------	680	820	1,640	5,100	5,960	2,000	890
6	680	890	-------	-------	750	820	1,640	4,720	5,730	1,880	890
7	680	960	-------	-------	750	1,040	2,120	5,960	5,510	1,760	890
8	620	960	-------	-------	820	1,130	2,380	6,970	5,730	1,640	890
9	620	890	-------	-------	890	2,770	2,510	8,050	5,300	1,530	890
10	620	890	-------	-------	960	3,350	2,380	9,490	4,910	1,530	890
11	560	820	-------	-------	1,000	4,030	2,770	11,700	4,540	1,420	890
12	650	560	-------	-------	1,040	4,080	2,640	12,300	4,200	1,420	890
13	650	410	-------	-------	1,130	3,690	2,770	11,000	4,030	1,420	890
14	650	460	-------	-------	1,220	3,350	3,040	10,400	3,690	1,420	890
15	680	460	-------	-------	1,320	3,040	3,350	11,000	3,520	1,420	890
16	680	460	-------	-------	1,370	2,510	3,520	11,400	3,350	1,320	890
17	750	460	-------	-------	1,420	2,000	4,540	11,000	3,190	1,220	890
18	820	410	-------	-------	1,220	1,760	4,720	11,000	3,520	1,330	890
19	855	410	-------	-------	1,040	1,320	4,910	10,700	3,860	1,330	890
20	890	410	-------	-------	890	1,130	5,510	10,400	3,520	1,330	890
21	890	-------	-------	-------	855	960	5,510	9,490	3,350	1,760	890
22	890	-------	-------	-------	820	1,130	5,510	8,050	3,040	1,420	890
23	925	-------	-------	-------	820	1,130	6,200	7,770	2,900	1,320	890
24	925	-------	-------	-------	925	1,130	6,200	7,500	2,900	1,220	890
25	925	-------	-------	-------	1,080	1,130	6,710	8,050	3,040	1,120	890
26	890	-------	-------	-------	1,130	1,130	6,970	8,610	3,040	1,040	890
27	820	-------	-------	-------	1,130	1,130	8,330	8,050	2,900	960	820
28	820	-------	-------	-------	820	1,130	8,330	6,970	2,640	890	820
29	750	-------	-------	-------	680	1,130	8,330	6,710	2,510	890	820
30	750	-------	-------	-------	750	1,130	8,610	6,450	2,380	890	820
31	750	-------	-------	-------	750	-------	9,190	-------	2,250	890	-------

NOTE.—Stage-discharge relation affected by ice; discharge estimated by means of study of gage heights, three discharge measurements, observer's notes, and weather records for the following days as shown in tables: Nov. 20, 21, 23–30, 1918, Mar. 1–23, 1919, and Mar. 1–14, 1920; for other periods as follows: Dec. 1–31, 1918, 449 second-feet; Jan. 1–31, 1919, 358 second-feet; Feb. 1–28, 1919, 346 second-feet; and Nov. 1, 1919, to Feb. 29, 1920, discharge not determined. Gage-height record fragmentary for January and February, 1919; observations discontinued during January and February, 1920. Gage not read; discharge estimated by comparison with records of flow at other stations in the basin as follows: Oct. 1–31, 1918, 900 second-feet; Nov. 1–3, 1918; and Sept. 4–24, 1920.

Monthly discharge of Green River at Green River, Wyo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	-------	-------	900	55,300
November	1,130	410	749	44,600
December	-------	-------	449	27,600
January	-------	-------	358	22,000
February	-------	-------	346	19,200
March	1,640	350	655	40,300
April	2,120	890	1,600	95,200
May	5,100	1,420	2,580	159,000
June	8,050	890	2,140	127,000
July	890	350	542	33,300
August	715	330	523	32,200
September	750	330	499	29,700
The year	8,050	-------	946	685,000
1919–20				
October	925	460	724	44,500
November 1–20	960	410	670	26,600
March	1,420	680	935	57,500
April	4,030	820	1,710	102,000
May	9,190	1,220	4,390	270,000
June	12,300	4,720	8,730	519,000
July	6,200	2,250	4,050	249,000
August	2,200	890	1,420	87,900
September	890	820	881	52,400

NOTE.—See footnote to table of daily discharge.

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GREEN RIVER AT LITTLE VALLEY, NEAR GREEN RIVER, UTAH

LOCATION.—In sec. 4, T. 22 S., R. 16 E., 1 mile above old Little Valley Ferry and 6 miles downstream from Green River, Emery County. San Rafael River enters Green River 16 miles downstream, in sec. 25, T. 23 S., R. 16 E.

DRAINAGE AREA.—41,000 square miles (measured in 1915, on best available maps of Colorado River basin).

RECORDS AVAILABLE.—December 18, 1910, to September 30, 1920. Records obtained at Green River (known also as Elgin or Blake) from 1894 to 1899 and 1905 to 1911 give practically the same flow.

GAGE.—Stevens continuous water-stage recorder on left bank 1 mile above old ferry, since December 16, 1917; referred to hook gage inside well and inclined staff gage outside; inspected by R. C. Wheeler. For history of previous gage see Water-Supply Paper 479.

DISCHARGE MEASUREMENTS.—Made from car on old ferry cable.

CHANNEL AND CONTROL.—Bed composed of gravel and sand. Principal control probably about two-thirds of a mile below gage; shifts occasionally.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 6.27 feet at 2 p. m. June 1 (discharge, 20,200 second-feet); minimum stage recorded, −0.44 foot at 11 a. m. Septe m ber 1 (discharge, 834 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 11.43 feet at 12.30 p. m. June 3 (discharge, 49,400 second-feet); minimum stage recorded, −0.95 foot December 1 (discharge, 510 second-feet).

1894–1899; 1905–1920: Maximum discharge recorded, 68,800 second-feet May 29, 1897; minimum stage recorded, −0.95 foot December 1, 1919 (discharge, 510 second-feet).

ICE.—Stage-discharge relation affected by ice nearly every winter.

DIVERSIONS.—Station is below practically all diversions from Green River.

REGULATION.—None.

ACCURACY.—Stage-discharge relation for low water changed September 28, 1919; affected by ice January 1 to March 9, 1919, and December 9, 1919, to February 20, 1920. Rating curves well defined between 800 and 70,000 second-feet. Operation of water-stage recorder satisfactory except during winter of 1918–19, and periods of extreme low water, July 25 to August 1, August 19 to September 1, and November 30 to December 3, 1919; during these periods water surface was below well intake and a temporary outside gage was read to hundredths once or twice daily. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph, or, for periods of low water by applying daily reading from temporary gage to rating table. For periods of ice effect mean discharge was ascertained by means of occasional gage readings, four discharge measurements, weather records, and observer's notes. Open-water records excellent; winter records fair.

COOPERATION.—Since December 16, 1917, station has been maintained by Utah Power & Light Co., which made most of the discharge measurements.

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Discharge measurements of Green River at Little Valley, near Green River, Utah, during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1918		*Feet*	*Sec.-ft.*	1919		*Feet*	*Sec.-ft.*
Nov. 19	H. L. Stoner [a]	1.53	2,890	Oct. 5	E. G. Thorum	0.58	1,590
1919				Nov. 3	do	1.04	2,040
Jan. 28	L. W. Jordan	[b] 2.25	1,580	4	do	1.02	2,090
May 12	E. G. Thorum [a]	4.60	12,400	Dec. 10	do	[b] .66	1,550
June 13	do	3.50	7,760	29	do	[b] 2.08	1,700
July 13	do	.69	1,860	1920			
15	do	.45	1,590	Feb. 18	E. G. Thorum	[b] 1.38	2,430
30	do	−.37	884	28	W. E. Dickinson	1.55	2,970
31	do	−.36	866	Mar. 21	E. G. Thorum	1.96	3,930
Aug. 24	do	−.10	1,010	May 15	do	7.19	25,100
Sept. 3	do	1.79	4,110	20	do	7.98	29,800
4	do	.58	1,740	June 10	W. E. Dickinson	9.51	37,800
5	do	.62	1,800	12	E. G. Thorum	9.85	40,500
9	W. E. Dickinson	.50	1,690	July 29	do	2.87	5,920
Oct. 4	E. G. Thorum	.62	1,660	Sept. 13	do	1.39	2,720

[a] Engineer, Utah Power & Light Co.
[b] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Green River at Little Valley, near Green River, Utah, for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918-19												
1	2,970	3,520	1,530				7,850	14,500	19,900	3,420	936	834
2	2,970	3,520	1,480				8,180	13,500	19,900	3,150	1,270	2,380
3	2,880	3,420	1,580				8,180	13,100	18,900	2,970	1,430	2,460
4	2,800	3,330	1,760				8,180	13,500	18,400	2,800	1,700	1,880
5	2,800	3,420	2,010			2,000	8,680	14,000	16,900	2,630	1,580	2,010
6	3,060	3,420	2,150				8,680	14,500	14,900	2,460	1,640	2,220
7	3,150	3,420	2,380				8,180	14,000	13,100	2,380	1,550	1,700
8	3,240	3,420	2,460				8,180	14,000	11,300	2,230	1,380	1,760
9	4,220	3,420	2,540				8,340	14,000	10,500	2,150	1,450	1,820
10	3,710	3,420	2,720			2,010	8,510	14,500	9,390	2,010	1,420	2,010
11	3,910	3,420	2,850			2,080	8,010	13,100	8,850	1,940	1,320	2,080
12	4,430	3,420	2,970			2,150	6,940	12,300	8,340	1,820	1,530	2,150
13	4,430	3,330	2,630			2,150	6,240	11,800	8,000	1,880	1,480	1,880
14	4,110	3,240	2,380	1,400	1,750	2,300	5,730	11,300	7,850	1,700	1,440	1,760
15	3,910	3,150	2,300			2,380	5,360	10,900	7,850	1,580	1,440	1,820
16	3,710	3,150	2,300			2,460	5,240	10,500	7,690	1,720	1,340	1,820
17	3,910	3,150	2,010			2,720	5,120	10,900	7,380	1,450	1,230	1,760
18	4,010	3,150	2,010			3,150	4,880	12,300	7,080	1,470	1,180	1,700
19	3,910	3,150	2,180			3,910	5,000	13,100	6,940	1,660	900	1,640
20	4,220	3,150	2,460			4,430	5,000	13,500	6,510	1,480	988	1,700
21	4,650	3,240	2,880			5,120	4,880	14,900	6,240	1,320	1,020	1,640
22	3,910	3,150	2,720			6,870	4,880	15,900	5,980	1,250	954	1,580
23	3,710	3,060	2,540			10,900	5,480	17,900	5,600	1,180	942	1,580
24	3,810	2,970	2,150			9,390	6,940	17,900	5,360	1,120	1,020	1,480
25	3,910	2,720	1,820			9,760	8,680	18,400	5,000	1,070	974	1,480
26	3,710	2,380	1,640			10,100	10,500	18,900	4,660	1,020	900	1,410
27	3,710	1,820	1,530			8,850	12,600	18,900	4,430	980	880	1,420
28	3,710	1,480	1,480	1,580		8,180	14,500	19,400	4,110	940	875	1,380
29	3,620	1,420	1,350		-------	7,540	14,900	19,400	3,910	900	850	1,870
30	3,620	1,530	1,480	1,550	-------	7,380	15,400	19,900	3,620	865	842	1,910
31	3,520	-------	1,310		-------	7,540	-------	19,900	-------	850	838	-------

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Daily discharge, in second-feet, of Green River at Little Valley, near Green River, Utah, for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919–20												
1	1,890	2,260	510			2,870	4,600	4,580	47,500	19,700	5,610	3,110
2	1,680	2,260	660			2,800	4,120	4,830	48,500	18,900	5,250	3,000
3	1,670	2,200	820			3,080	3,740	5,340	49,100	17,400	5,610	2,870
4	1,640	2,180	1,140			3,110	3,480	6,350	48,100	16,600	5,300	2,760
5	1,600	2,170	1,300			3,210	3,500	9,330	45,200	16,400	5,100	2,800
				1,720								
6	1,700	2,100	1,470			3,300	3,260	12,300	40,300	15,500	6,220	2,980
7	1,720	2,080	1,530			3,280	3,130	13,900	37,300	14,600	5,640	2,750
8	1,730	2,450	1,560			3,170	3,170	14,600	36,500	13,800	4,900	2,960
9	1,780	2,290	1,560			3,020	3,660	16,000	36,900	13,200	4,580	3,080
10	1,880	2,280	1,550		2,320	2,980	4,620	18,000	38,100	12,300	4,470	2,800
11	2,040	2,370				2,890	5,440	19,400	39,600	11,700	4,580	2,840
12	2,240	2,340				3,080	6,870	20,900	40,000	10,900	4,600	2,710
13	2,180	2,450				3,660	9,210	22,600	39,500	10,200	4,180	2,750
14	2,120	2,390				4,360	10,600	24,100	39,200	9,530	3,800	2,520
15	2,050	2,230				4,530	10,300	25,000	38,100	8,870	3,660	2,520
			1,450	1,500								
16	1,990	2,120				4,850	10,200	25,800	36,700	8,280	3,480	2,430
17	2,000	1,960				4,140	10,700	26,100	34,700	7,980	3,320	2,390
18	2,020	1,820			2,430	4,310	11,800	28,200	33,100	7,590	3,230	2,340
19	2,120	1,820			2,400	4,050	12,300	29,500	31,800	7,250	3,250	2,470
20	2,080	1,850			2,400	4,030	11,300	29,600	30,400	6,930	5,440	2,320
21	2,040	1,990			2,480	3,860	9,570	31,100	28,300	6,590	6,370	2,400
22	2,020	2,120			2,710	3,860	7,590	35,300	26,400	6,480	5,320	2,290
23	2,040	2,200			2,760	4,140	6,650	39,200	24,800	6,650	5,440	2,140
24	2,120	2,230			2,420	4,620	6,090	42,100	23,300	6,670	5,080	2,050
25	2,180	2,320	1,750		2,340	4,900	5,710	43,700	22,500	6,430	4,010	2,060
				2,000								
26	2,170	2,430			2,390	5,130	5,370	44,700	21,300	6,270	3,780	2,060
27	2,170	2,290			2,660	5,220	5,030	46,400	20,800	6,220	4,220	2,110
28	2,220	1,860			3,040	5,010	4,830	46,500	21,100	6,240	3,620	2,140
29	2,240	1,280	1,700		3,040	5,130	4,620	46,800	21,800	6,090	3,660	2,180
30	2,240	710	1,680		-------	5,250	4,550	48,100	20,800	5,840	3,520	2,290
31	2,240	-------			-------	5,080	-------	48,100	-------	5,810	3,300	-------

NOTE.—Braced figures show mean discharge for periods included; estimated because of ice. Ice effect also Dec. 9, 10, 1919, and Feb. 18–20, 1920, daily discharge estimated as shown in table. Discharge interpolated on account of lack of gage-height record July 25, 27–29, Sept. 11, and Dec. 2, 1919.

Monthly discharge of Green River at Little Valley, near Green River, Utah, for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	4,650	2,800	3,680	226,000
November	3,520	1,420	3,010	179,000
December	2,970	1,310	2,120	130,000
January	----------	----------	1,420	87,300
February	----------	----------	1,750	97,200
March	10,900	----------	4,500	277,000
April	15,400	4,880	7,970	474,000
May	19,900	10,500	14,900	916,000
June	19,900	3,620	9,290	553,000
July	3,420	850	1,750	108,000
August	1,700	838	1,200	73,800
September	2,460	834	1,790	107,000
The year	19,900	834	4,460	3,230,000
1919–20				
October	2,240	1,600	1,990	122,000
November	2,450	710	2,100	125,000
December	----------	510	1,470	90,400
January	----------	----------	1,750	108,000
February	3,040	----------	2,430	140,000
March	5,250	2,800	3,970	244,000
April	12,300	3,130	6,530	389,000
May	48,100	4,580	26,700	1,640,000
June	49,100	20,800	34,100	2,030,000
July	19,700	5,810	10,200	627,000
August	6,370	3,280	4,530	279,000
September	3,110	2,050	2,540	151,000
The year	49,100	510	8,190	5,950,000

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COTTONWOOD CREEK NEAR BIG PINEY, WYO.

LOCATION.—About sec. 21, T. 32 N., R. 111 W., at highway bridge near Hayden's ranch, 16 miles north of Big Piney, in Lincoln County.

DRAINAGE AREA.—241 square miles (measured on United States Geological Survey map of Wyoming, scale 1:500,000).

RECORDS AVAILABLE.—April 25, 1916, to September 9, 1919, when station was discontinued.

GAGE.—Creek flows in two channels 1 mile apart; vertical staff on north channel, and Stevens water-stage recorder on south channel, installed May 7, 1918, at datum of vertical staff used previously; both gages read by M. G. Dunham.

DISCHARGE MEASUREMENTS.—Made from bridge on each channel or by wading.

CHANNEL AND CONTROL.—North channel: Channel composed of coarse gravel; control apparently permanent during 1919. South channel: Channel composed of sand and gravel; control apparently permanent during 1919.

EXTREMES OF DISCHARGE.—North channel: Maximum stage recorded during year ending September 30, 1919, 2.6 feet at 5 p. m. April 2 (discharge, 244 second-feet); minimum discharge, stream dry during part of August and all of September.

South channel: Maximum stage from water-stage recorder during year ending September 9, 1919, 2.86 feet at 7 p. m. April 15 (discharge, 65 second-feet); minimum discharge, stream dry July 7–9 and August 16 to September 4.

ICE.—Stage-discharge relation seriously affected by ice; observations discontinued during winter.

DIVERSIONS.—Prior to July 1, 1919, adjudicated diversions of 51 second-feet from Cottonwood Creek above station and 49 second-feet below.

REGULATION.—Diversion works at point where channels fork control flow through both channels during low stages.

ACCURACY.—North channel: Stage-discharge relation practically permanent; affected by ice during winter. Rating curve well defined below 200 second-feet; fairly well defined above. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

South channel: Stage-discharge relation practically permanent; affected by ice during winter. Rating curve fairly well defined below 100 second-feet. Mean daily gage height, to hundredths, obtained by inspecting recorder graph. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent except for days of missing gage heights, for which they are fair.

Discharge measurements of Cottonwood Creek (north channel) near Big Piney, Wyo., during the year ending Sept. 30, 1919

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
June 19	J. B. Spiegel	0.90	[a] 1.5
Sept. 9	P. V. Hodges		([b])

[a] Estimated. [b] Dry.

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Daily discharge, in second-feet, of Cottonwood Creek (north channel) near Big Piney, Wyo., for the year ending Sept. 30, 1919

Day	Oct.	Nov.	Apr.	May	June	July	Aug.
1	25	23	220	39	42	5	0.5
2	28	23	244	33	40	5	.5
3	28	25	220	32	37	5	1.5
4	30	25	196	23	35	5	5
5	32	28	185	25	30	5	10
6	32	30	142	17	26	5	10
7	32	32	106	16	23	3.2	10
8	32	32	60	10	28	3.2	7.5
9	32	32	74	10	23	42	5
10	32	32	70	5	16	41	3.2
11	32	32	81	8	10	40	2.6
12	30	32	104	10	5	37	1.5
13	30	32	84	10	5	37	.5
14	30	--------	104	11	5	36	--------
15	28	--------	107	10	5	34	--------
16	28	--------	112	10	5	32	--------
17	28	--------	111	11	5	28	--------
18	28	--------	109	12	5	26	--------
19	30	--------	112	15	1.5	23	--------
20	30	--------	142	16	5	23	--------
21	30	--------	196	23	5	20	--------
22	32	--------	196	24	5	20	--------
23	32	--------	163	24	5	18	--------
24	32	--------	114	25	1.5	16	--------
25	30	--------	94	25	1.5	16	--------
26	27	--------	87	26	1.5	15	--------
27	23	--------	59	27	1.5	13	--------
28	22	--------	50	28	1.5	10	--------
29	19	--------	43	30	1.5	7.5	--------
30	19	--------	42	33	1.5	5	--------
31	22	--------	--------	37	--------	.5	--------

NOTE.—No record during winter from Nov. 14 to Apr. 1. Stream dry Aug. 14 to Sept. 30.

Monthly discharge of Cottonwood Creek (north channel) near Big Piney, Wyo., for the year ending Sept. 30, 1919

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	32	19	28.5	1,730
November 1–13	32	23	29.1	751
April	244	42	121	7,200
May	39	5	20.2	1,240
June	42	1.5	12.6	750
July	42	.5	18.6	1,140
August	10	0	1.86	114

NOTE.—See footnote for table of daily discharge.

Discharge measurements of Cottonwood Creek (south channel) near Big Piney, Wyo., during the period Oct. 1, 1918, to Sept. 9, 1919

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
June 19	J. B. Spiegel	1.90	2.50
Sept. 9	P. V. Hodges	1.82	2.25

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Daily discharge, in second-feet, of Cottonwood Creek (south channel) near Big Piney, Wyo., for the period Oct. 1, 1918, to Sept. 9, 1919

Day	Oct.	Nov.	Apr.	May	June	July	Aug.	Sept.
1	16	19		44	18	0.8	2.2	
2	19	18		38	18	.4	2.3	
3	19	18		33	18	.4	2.4	
4	19	19		29	18	.4	2.5	
5	22	18		24	17	.4	2.6	1.0
6	23	19		17	17	.2	2.6	2.0
7	21	20		17	17		2.4	2.0
8	21	22		17	17		1.8	2.0
9	19	22		17	17		1.5	2.2
10	17	24		21	16	2.0	1.3	
11	17	24		23	16	4.0	1.9	
12	17	22		17	16	6.5	1.5	
13	17	20			15	7.0	1.2	
14	17		62		12	7.5	.6	
15	18		62		9	7.5	.4	
16	18		52		6	4.5		
17	20		57		5	3.3		
18	21		54		4	2.9		
19	22		54		3.6	2.5		
20	18		54		3.0	2.8		
21	18		51		2.8	2.9		
22	16		48		2.4	2.2		
23	18		49		2.3	2.2		
24	18		49		2.1	2.2		
25	18		49		1.8	2.0		
26	15		48		1.5	2.1		
27	16		49		1.4	2.1		
28	16		48		1.2	2.8		
29	18		46		1.1	2.2		
30	22		45		1.0	2.1		
31	21					2.1		

NOTE.—No gage-height record Nov. 7-9, Apr. 28-30, June 14-18, 27-29, July 9-12, July 31-Aug. 5, Aug. 31-Sept. 8. Discharge interpolated. No record during winter from Nov. 14 to Apr. 18. No flow July 7-9 and Aug. 16 to Sept. 4.

Monthly discharge of Cottonwood Creek (south channel) near Big Piney, Wyo., for the period Oct. 1, 1918, to Sept. 9, 1919

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	23	15	18.6	1,140
November 1-13	24	18	20.4	526
April 14-30	62	45	51.6	1,740
May 1-12	44	17	24.8	590
June	18	1.0	9.34	556
July	7.5	0	2.50	154
August	2.6	0	.88	54
September 1-9	2.2	0	1.02	18

NOTE.—See footnote to table of daily discharge.

EAST FORK AT NEWFORK, WYO.

LOCATION.—About sec. 33, T. 32 N., R. 108 W., at highway bridge a quarter of a mile south of Newfork, Freemont County. No tributary between station and mouth, 1 mile below.

DRAINAGE AREA.—348 square miles (measured on United States Geological Survey map of Wyoming, scale 1: 500,000).

RECORDS AVAILABLE.—April 1, 1905, to October 31, 1906; May 11, 1915, to September 30, 1920.

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GAGE.—Vertical staff on downstream side of left abutment; a temporary gage 1½ miles upstream from the bridge was used June 18, 1919, to May 18, 1920. Gages read by J. W. Glaze and Mrs. J. Ball. Gage one-quarter of a mile upstream used during 1905; gage used during 1906 located at bridge and referred to datum 0.27 foot higher than present gage.

DISCHARGE MEASUREMENTS.—Made from two-span highway bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel. Control 100 feet downstream at gravel bar which is slightly shifting. Banks subject to overflow at stage of 6 feet.

EXTREMES OF DISCHARGE.—Data too few to determine extremes during year ending September 30, 1919.

Maximum stage recorded during year ending September 30, 1920, 6.13 feet at 6 a. m. June 10 (discharge, 2,410 second-feet); minimum discharge, 25 second-feet on April 2 and 4.

1915–1920: Maximum stage recorded, 6.8 feet at 6 a. m. June 11, 1918 (discharge, 3,020 second-feet); minimum discharge recorded in 1920.

ICE.—Stage discharge relation seriously affected by ice; observations discontinued during winter.

DIVERSIONS.—Prior to July 1, 1919, adjudicated diversions of 143 second-feet from East Fork, all above station.

REGULATION.—Flow of East Fork regulated to limited extent by many small lakes at headwaters.

ACCURACY.—Stage-discharge relation shifted slightly. Rating curves used October 1, 1918, to November 21, 1918, well defined between 50 and 3,000 second-feet; curves used June 18 to November 8, 1919, and April 1 to May 18, 1920, referred to temporary gage 1½ miles upstream, well defined between 30 and 400 second-feet, and curve used May 19 to September 30, 1920, at permanent gage well defined below 500 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for periods of ice effect and shifting-control method used June 11–25, 1920. Records for 1920 good except for June for which they are fair. Records for 1919 fragmentary because of inability to obtain observer.

Discharge measurements of East Fork at Newfork, Wyo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft.*	1920		*Feet*	*Sec.-ft.*
June 18	J. B. Spiegel	[a] 5.01	76	May 19	J. B. Spiegel	2.75	464
Sept. 11	P. V. Hodges	[b] 4.66	37.8	June 15	do	4.27	1,128

[a] Lower gage reading, 1.40.

[b] Lower gage reading, 1.09.

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Daily discharge, in second-feet, of East Fork at Newfork, Wyo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Apr.	May	June	July	Aug.	Sept.
1918–19								
1	58	71					41	
2	58	70					41	
3	60	70						
4	61	68						
5	61	70						
6	64	70						
7	66	68						
8	82	57						
9	77	75						
10	72	72						
11	69	72						36
12	68	71						36
13	68	64						36
14	67	64						36
15	67	67						36
16	67	67						36
17	67	69						36
18	67	69			76			36
19	73	69						36
20	74	63						36
21	72	61						36
22	71	55						36
23	72	50						37
24	72	45						37
25	70	40						37
26	69	40						39
27	68	42				36		38
28	68	45				36		46
29	71	48				41		46
30	70	50				41		41
31	71					41		
1919–20								
1	43	45	42	63	1,500	351	57	57
2	43	48	25	75	1,200	314	57	57
3	45	48	33	63	1,620	314	57	57
4	41	49	25	63	1,030	279	57	57
5	40	46	33	75	1,440	246	57	54
6	41	46	33	75	1,940	202	57	54
7	44	39	33	75	1,940	162	57	54
8	44	39	42	63	2,000	138	57	54
9	43		236	89	2,320	116	57	57
10	45		400	89	2,200	96	57	57
11	45		183	89	1,620	87	57	57
12	44		140	105	1,200	87	66	57
13	43		305	105	1,260	78	62	57
14	45		305	122	1,140	78	62	54
15	46		140	160	1,080	66	57	54
16	46		89	183	975	78	57	54
17	46		63	183	920	87	57	54
18	46		52	305	810	78	57	54
19	46		52	430	655	78	57	57
20	50		52	492	538	72	62	57
21	51		52	605	515	72	66	54
22	53		42	865	538	66	62	54
23	51		52	1,090	515	62	62	54
24	51		52	1,080	492	66	57	54
25	51		52	1,260	390	72	57	54
26	46		52	1,260	314	72	57	54
27	43		63	1,320	262	66	57	54
28	46		75	1,680	262	66	57	54
29	51		75	2,060	351	62	57	54
30	50		75	2,130	351	62	57	54
31	45			1,870		57	57	

NOTE.—Stage-discharge relation affected by ice Nov. 22–30, 1918, and Oct. 30 to Nov. 3, 1919; discharge estimated from study of gage heights, weather records, and observer's notes. Stage-discharge relation affected by backwater from New Fork June 11–25, 1920; maximum backwater, 0.2 foot, determined by discharge measurement. Records discontinued during winter, and lack of records for the remaining days for which no discharge is given was due to inability to obtain observer.

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Monthly discharge of East Fork at Newfork, Wyo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	82	58	66.5	4,210
November	75	40	61.4	3,650
September 11–30	46	36	37.6	1,490
1919–20				
October	53	40	45.9	2,820
November 1–8	49	39	45.0	714
April	400	25	95.8	5,700
May	2,130	63	583	35,800
June	2,320	262	1,050	62,500
July	351	57	120	7,380
August	66	57	58.4	3,590
September	57	54	55.1	3,280

NEW FORK NEAR BOULDER, WYO.

LOCATION.—About sec. 8, T. 32 N., R. 108 W., at highway bridge 1 mile west of Boulder, Fremont County. Nearest tributary, Boulder Creek, enters an eighth of a mile below.

DRAINAGE AREA.—578 square miles (measured on United States Geological Survey map of Wyoming, scale 1: 500,000).

RECORDS AVAILABLE.—May 11, 1915, to September 30, 1920.

GAGE.—Vertical staff on downstream side of left abutment; read by J. O. Orcutt and Miss Tula Brandt.

DISCHARGE MEASUREMENTS.—Made from two-span bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel underlain by slate; somewhat shifting at intervals. No well-defined control. At high water there are two overflow channels, one around right end of bridge, and other from New Fork to Boulder Creek.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 5.35 feet at 6 a. m. May 31 (discharge, 2,480 second-feet); minimum discharge occurred during winter.

Maximum daily discharge during year ending September 30, 1920, from comparison with records of near-by stations was 2,950 second-feet on June 10 Minimum discharge occurred during winter.

1915–1920: Maximum stage recorded, 8.7 feet at 6 a. m. June 17, 1918 (discharge, 12,300 second-feet); minimum discharge of 42 second-feet occurred from December 15 to 17, 1915.

ICE.—Stage-discharge relation seriously affected by ice; observations discontinued during winter.

DIVERSIONS.—Prior to July 1, 1919, adjudicated diversions of 191 second-feet from New Fork above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent during 1919 and 1920. Rating curves well defined between 70 and 7,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, except for period affected by ice. Records good except for November, 1919, and June, 1920, for which they are fair.

Discharge measurements of New Fork near Boulder, Wyo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft.*	1920		*Feet*	*Sec.-ft.*
June 18	J. B. Spiegel	2.77	425	May 20	J. B. Spiegel	3.03	551
[illegible] 11	P. V. Hodges	1.86	91	June 15	do	5.56	2,760

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Daily discharge, in second-feet, of New Fork near Boulder, Wyo., for the years ending Sept. 30, 1919 and 1920.

Day	Oct.	Nov.	Apr.	May	June	July	Aug.	Sept.
1918-19								
1	145	212	116	145	2,000	187	93	66
2	145	212	120	160	1,800	180	101	76
3	151	205	120	160	1,270	160	101	76
4	157	198	120	160	1,040	145	95	88
5	170	198	120	176	905	142	90	95
6	187	188	120	176	775	132	88	97
7	216	170	110	160	710	125	84	101
8	223	167	120	145	840	112	80	95
9	231	157	110	145	710	114	86	90
10	250	157	110	160	620	105	88	88
11	266	157	110	145	620	99	86	90
12	278	148	110	145	590	95	86	91
13	274	145	110	160	535	97	82	91
14	270	157	110	160	535	97	84	91
15	262	164	110	164	485	95	86	95
16	258	160	110	194	485	91	76	93
17	274	148	120	250	435	91	76	88
18	290	145	120	335	385	95	76	88
19	290	145	120	435	435	84	75	95
20	282	145	120	620	410	75	75	90
21	274	151	132	840	410	69	73	88
22	266	145	110	1,120	360	80	75	88
23	270	128	110	1,270	335	76	73	88
24	258	110	110	1,350	335	88	69	91
25	250	103	120	1,430	312	86	66	91
26	235	103	132	1,510	290	88	69	91
27	227	107	132	1,510	270	82	66	91
28	239	112	132	1,600	250	82	66	88
29	235	116	132	1,800	212	84	66	80
30	231	120	145	2,210	212	88	66	99
31	212	-------	-------	2,320	-------	90	69	-------
1919-20								
1	116	128	-------	-------	1,350	1,800	680	231
2	116	132	-------	-------	1,300	2,000	620	223
3	120	140	-------	-------	1,030	2,000	620	223
4	116	135	-------	-------	980	2,000	620	223
5	116	128	-------	-------	1,300	2,100	620	223
6	116	135	-------	-------	1,650	2,000	620	223
7	120	140	-------	-------	1,900	1,900	620	223
8	120	120	-------	-------	2,300	1,600	562	223
9	120	116	-------	-------	2,650	1,600	535	223
10	125	112	-------	-------	2,950	1,510	510	227
11	120	103	-------	-------	2,880	1,510	460	231
12	120	95	-------	-------	2,840	1,430	435	223
13	120	103	-------	-------	2,800	1,270	460	216
14	125	112	-------	-------	2,790	1,270	410	208
15	130	120	-------	-------	2,790	1,190	410	208
16	128	128	-------	-------	2,790	1,190	410	205
17	120	128	-------	-------	2,790	1,190	360	198
18	120	128	-------	-------	2,930	1,190	360	190
19	122	125	-------	-------	2,790	1,190	385	183
20	135	120	-------	535	2,660	1,120	360	183
21	135	135	-------	562	2,660	1,120	360	176
22	142	125	-------	808	2,100	1,700	360	160
23	145	128	-------	840	2,210	1,040	335	183
24	148	130	-------	905	2,540	742	312	183
25	148	120	-------	975	2,540	742	312	180
26	140	120	-------	905	2,310	840	290	180
27	125	120	-------	905	2,210	680	290	180
28	157	120	-------	905	2,000	775	270	170
29	140	120	-------	1,040	1,900	808	250	151
30	135	128	-------	1,190	1,700	742	250	151
31	128	-------	-------	1,190	-------	742	242	-------

NOTE.—Stage-discharge relation affected by ice Nov. 16-20, 23-30, 1918; Apr. 1-4, Oct. 31, Nov. 1, 5, 9-23, 28-30, 1919; discharge estimated by study of gage height, weather records, and observer's notes.

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Monthly discharge of New Fork near Boulder, Wyo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	290	145	236	14,500
November	212	103	152	9,040
April	145	110	119	7,080
May	2,320	145	682	41,900
June	2,000	212	619	36,800
July	187	69	104	6,400
August	101	66	79.5	4,910
September	101	66	89.3	5,310
1919–20				
October	157	116	128	7,870
November	140	95	123	7,320
May 20–31	1,190	535	897	21,400
June	2,950	980	2,260	134,000
July	2,100	680	1,320	81,200
August	680	242	432	26,600
September	231	151	200	11,900

NOTE.—Records discontinued during winter of 1919 and 1920. Revised monthly figures supersede those published in Water-Supply Paper 469.

PINE CREEK AT PINEDALE, WYO.

LOCATION.—In sec. 4, T. 33 N., R. 109 W., at highway bridge at Pinedale, Fremont County. No important tributary between station and mouth, 3 miles below.

DRAINAGE AREA.—128 square miles (measured on United States Geological Survey map of Wyoming, scale 1:500,000).

RECORDS AVAILABLE.—May 8, 1915, to September 30, 1920.

GAGE.—Vertical staff located on downstream side of bridge pier; read by employee of United States Forest Service. Prior to August 17, 1917, vertical staff located a quarter of a mile downstream at left bank. No determined relation between gages.

DISCHARGE MEASUREMENTS.—Made from two-span bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel. Control at rapids just below gage; slightly shifting. Banks subject to overflow at extreme high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 3.2 feet at 6 p. m. May 30 (discharge, 1,110 second-feet); minimum discharge occurred during winter.

Maximum stage recorded during year ending September 30, 1920, 3.15 feet at 8 a. m. June 16 (discharge, 1,080 second-feet); minimum discharge occurred during winter.

1915–1920: Maximum stage recorded, 5.0 feet at 8 a. m. and 5 p. m., June 17, 1918 (discharge, 2,310 second-feet); minimum discharge occurred January 28–30, 1916, when stage-discharge relation was affected by ice (discharge estimated as 6 second-feet).

ICE.—Stage-discharge relation affected by ice.

—Prior to July 1, 1919, adjudicated diversions of 73 second-feet
ne Creek above Pinedale and 4 second-feet below.

.—Flow naturally regulated by Fremont Lake, which has an area of
nately 8 square miles and drains 110 square miles.

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ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 30 and 1,400 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for periods affected by ice. Records good except for periods affected by ice and for days of missing gage heights for which they are fair.

COOPERATION.—Gage heights furnished by United States Forest Service.

Discharge measurements of Pine Creek at Pinedale, Wyo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft.*	1920		*Feet*	*Sec.-ft.*
June 19	J. B. Spiegel	1.70	199	May 18	J. B. Spiegel	1.28	98
Sept. 10	P. V. Hodges	.91	49.5	June 16	do	3.07	1,060

Daily discharge, in second-feet, of Pine Creek at Pinedale, Wyo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918-19												
1	46	67	36				20	31	970	84	24	29
2	46	67	36				21	34	900	80	24	47
3	49	67	35				20	37	795	74	42	47
4	52	64	40				20	37	620	57	40	48
5	52	64	30				19	39	522	54	39	48
6	53	64	29				19	38	490	51	38	48
7	65	62	29				18	38	460	41	38	48
8	70	57	30				18	28	430	36	38	48
9	70	55	31				19	19	370	31	38	48
10	78	52					18	20	370	31	32	50
11	80	47					19	22	320	30	32	50
12	84	52					18	24	320	26	31	52
13	82	50					18	26	295	25	26	55
14	84	48					19	29	295	24	25	52
15	84	48					20	31	270	23	25	53
16	85	48					20	33	230	24	26	55
17	100	47					20	36	200	23	28	55
18	100	46					20	48	215	23	29	55
19	98	44					20	61	200	21	29	48
20	98	43					20	92	185	20	29	43
21	97	44					20	165	185	20	29	42
22	94	44					20	250	170	20	29	40
23	91	42					20	430	165	21	29	40
24	88	41					19	588	162	21	29	40
25	85	41					20	679	160	21	29	40
26	82	40					21	760	140	19	29	40
27	82	38					24	830	116	19	29	40
28	82	38					26	900	112	21	29	41
29	82	37					29	970	100	25	29	42
30	79	37					29	1,110	96	25	29	45
31	72							1,040		24	30	

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Daily discharge, in second-feet, of Pine Creek at Pinedale, Wyo., for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919–20												
1	46	48	------	------	25	25	25	42	320	865	320	91
2	46	48	------	------	27	25	25	37	345	865	320	90
3	46	46	------	------	28	25	25	39	345	900	320	88
4	46	46	------	------	26	25	25	38	370	900	270	86
5	46	48	------	------	29	25	26	40	370	900	230	84
6	55	------	------	------	28	25	26	38	430	900	230	83
7	54	------	------	------	26	25	28	39	490	900	230	83
8	53	------	------	------	26	25	31	40	588	865	215	79
9	53	------	------	------	34	25	33	46	690	830	200	78
10	53	------	------	------	40	26	32	47	830	830	185	76
11	53	------	------	------	40	25	30	48	900	795	170	76
12	53	------	------	------	42	26	31	52	985	760	158	74
13	53	------	------	------	42	25	32	56	988	690	180	73
14	57	------	------	------	42	25	32	58	1,040	690	145	70
15	57	------	------	------	46	25	31	69	1,040	690	145	68
16	57	------	------	------	50	25	34	73	1,040	690	145	66
17	52	------	------	------	46	26	35	79	1,040	690	140	64
18	52	------	------	------	49	26	35	97	1,040	620	120	62
19	57	------	------	------	50	26	35	108	970	588	120	60
20	57	------	------	------	50	26	35	110	985	588	116	56
21	57	------	------	------	42	25	37	116	900	555	112	53
22	48	------	------	------	33	25	34	140	900	555	108	48
23	55	------	------	------	25	25	37	148	935	490	104	45
24	55	------	------	------	25	25	34	155	970	490	100	53
25	55	------	------	------	25	25	35	155	970	490	97	51
26	55	------	------	30	25	25	37	160	900	490	96	50
27	55	------	------	28	25	25	36	165	830	460	94	49
28	53	------	------	25	25	25	34	190	820	420	91	49
29	52	------	------	28	25	25	37	220	820	370	88	47
30	52	------	------	25	------	25	36	250	865	345	85	46
31	52	------	------	25	------	26	------	270	------	320	88	------

NOTE.—No gage-height record Nov. 28, Dec. 1, 8, 1918; Apr. 27, May 11, 25, June 1, Aug. 24, Sept. 21, 28, Oct. 3, 4, 1919; Apr. 10, May 23, 28, 29, June 13, 20, July 4, 11, Aug. 1, 8, 15, 20–25, 26, 28, 29, 31, Sept. 2–6, 9, 12–23, 25–30, 1920; discharge determined from study of flow of New Fork near Boulder and knowledge of stream-flow behavior. Stage-discharge relation estimated for ice effect for following days; Nov. 24, 25, 28–30, Dec. 1, 2, 1918; Feb. 6, 7, and Feb. 24 to Mar. 9, 1920, from study of gage heights, weather records, and observer's notes. See footnote to table of monthly discharge for other estimates on winter periods.

Monthly discharge of Pine Creek at Pinedale, Wyo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	100	46	77.7	4,780
November	67	37	49.8	2,960
December 1–9	40	29	32.9	587
April	29	18	20.5	1,220
May	1,110	19	272	16,700
June	970	96	329	19,600
July	84	19	32.7	2,010
August	42	25	30.7	1,890
September	55	29	46.3	2,760
1919–20				
October	57	46	52.8	3,260
November	------	------	47	2,800
December	------	------	44	2,710
January	------	------	37.2	2,290
February	50	25	34.3	1,970
March	26	25	25.2	1,550
April	37	25	32.1	1,910
May	270	37	101	6,210
June	1,040	320	788	46,900
July	900	320	663	40,800
August	320	85	161	9,900
September	91	45	66.4	3,950
The year	1,040	------	171	124,000

NOTE.—Stage-discharge relation affected by ice; monthly mean estimated for December, 1918, November and December, 1919, and January, 1920. Record discontinued during January, February, and March, 1919. Monthly figures, as published above, supersede those in Water-Supply Paper 469.

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BOULDER CREEK NEAR BOULDER, WYO.

LOCATION.—In sec. 4 T. 32 N., R. 108 W., at Sandlin's ranch, 2 miles northwest of Boulder, Fremont County. No tributary between station and mouth, 2 miles below.

DRAINAGE AREA.—112 square miles (measured on United States Geological Survey map of Wyoming, scale 1: 500,000).

RECORDS AVAILABLE.—April 23, 1904, to October 31, 1906; May 10, 1915, to September 30, 1920.

GAGE.—Chain gage installed May 19, 1920, 50 feet upstream from vertical staff; read by Mrs. M. M. Sandlin. Vertical staff used from May 10, 1915, to May 19, 1920. The vertical and staff gages are at same datum. Gage used 1904 to 1906 is not comparable with the above gages, as high water during intervening period cut a new channel and changed control.

DISCHARGE MEASUREMENTS.—Made by wading or from bridge 1¾ miles downstream.

CHANNEL AND CONTROL.—Bed composed of gravel; deep pool at gage. Control 150 feet downstream at rapids which shift slightly at intervals. Banks are high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 5.17 feet at 6 p. m. May 30 (discharge, 1,940 second-feet); minimum stage, 0.35 foot on numerous days during August and September (discharge, 3 second-feet).

Maximum stage recorded during year ending September 30, 1920, 5.45 feet at 5 p. m. June 9 and 7 a. m June 10 (discharge, 2,160 second-feet); minimum stage, 0.50 foot from September 21 to 30 (discharge, 9 second-feet).

1904–1906; 1915–1920: Maximum stage recorded, 6.8 feet at 7 a. m. June 14, 1918 (discharge, 3,240 second-feet); minimum stage, 0.38 foot on August 31, 1915 (discharge, 0.9 second-foot).

ICE.—Stage-discharge relation seriously affected by ice.

ACCURACY.—Stage-discharge relation shifted slightly during October, 1918, and September, 1920. Rating curve well defined; applied indirectly for shifting control October 1 to November 21, 1918, and August 21 to September 30, 1920. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for periods for which shifting control was used and for periods of ice effect as noted in footnote to table of daily discharge. Records excellent.

Discharge measurements of Boulder Creek near Boulder, Wyo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft.*	1920		*Feet*	*Sec.-ft.*
June 18	J. B. Spiegel	1.70	126	May 19	J. B. Spiegel	2.09	212
Sept. 11	P. V. Hodges	.33	3.1	June 15	do	4.94	1,060

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Daily discharge, in second-feet, of Boulder Creek near Boulder, Wyo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19									
1	8	29	-------	19	82	700	25	6	3
2	9	29	-------	19	83	478	20	6	3
3	10	25	-------	19	86	338	16	6	3
4	11	22	-------	22	72	269	16	6	3
5	14	22	-------	23	76	233	12	6	3
6	18	22	-------	22	77	221	10	4	3
7	14	22	-------	25	62	208	11	4	3
8	14	22	-------	19	57	200	10	4	3
9	14	22	-------	17	54	221	10	4	3
10	15	23	-------	18	60	221	10	4	3
11	13	34	-------	15	66	221	8	4	3
12	11	48	-------	5	74	212	9	4	3
13	5	48	-------	5	100	210	9	3	3
14	5	51	-------	4	118	205	8	3	3
15	5	51	-------	4	183	188	8	3	3
16	5	51	-------	4	257	156	8	3	3
17	25	51	-------	6	338	135	8	3	3
18	63	50	-------	11	458	122	7	3	3
19	61	50	-------	16	672	112	7	3	3
20	58	49	-------	30	992	106	7	3	3
21	51	47	-------	43	1,130	98	7	3	3
22	51	-------	-------	56	1,140	85	7	3	3
23	51	-------	19	70	1,140	87	7	3	3
24	51	-------	19	69	1,060	75	7	3	3
25	47	-------	20	70	1,020	62	7	3	3
26	41	-------	21	61	1,020	54	7	3	3
27	42	-------	20	75	992	50	7	3	3
28	42	-------	19	77	1,030	39	6	3	3
29	36	-------	18	74	1,150	26	6	3	3
30	34	-------	20	82	1,900	25	6	3	3
31	30	-------	20	-------	1,340	-------	6	3	-------
1919–20									
1	4	60	-------	-------	87	1,010	650	81	16
2	5	60	-------	-------	91	830	650	77	16
3	5	60	-------	-------	91	725	700	69	14
4	6	61	-------	-------	91	700	700	67	13
5	8	66	-------	-------	91	920	650	62	12
6	7	60	-------	-------	91	1,220	550	58	13
7	7	60	-------	-------	95	1,360	510	51	12
8	24	60	-------	-------	95	1,640	450	47	12
9	44	55	-------	-------	102	1,290	390	46	12
10	52	50	-------	-------	110	1,360	370	41	12
11	59	45	-------	-------	110	1,680	350	38	12
12	64	40	-------	-------	110	1,640	330	38	12
13	67	40	-------	-------	110	1,800	292	36	12
14	69	45	-------	95	118	1,880	292	33	12
15	69	50	-------	85	136	1,800	260	32	11
16	69	50	-------	85	156	1,640	230	29	12
17	67	50	-------	85	167	1,490	215	28	10
18	67	55	-------	85	178	1,290	202	26	10
19	67	60	-------	85	190	1,040	190	23	10
20	67	60	-------	85	275	860	178	23	10
21	67	65	-------	82	390	860	167	22	10
22	67	68	-------	85	450	980	167	21	9
23	67	66	-------	82	202	1,040	156	19	9
24	67	61	-------	82	800	1,040	156	19	9
25	67	63	-------	82	650	860	156	18	9
26	67	55	-------	82	650	650	156	17	9
27	67	50	-------	85	650	750	146	16	9
28	67	45	-------	85	860	510	136	16	9
29	60	45	-------	85	1,100	490	118	16	9
30	60	45	-------	85	1,160	650	95	16	9
31	60	-------	-------	-------	1,100	-------	90	16	-------

NOTE.—Stage-discharge relation affected by ice Nov. 6–21, 26–30, 1919; discharge determined by study of gage height, weather records, and observer's notes. Records discontinued during winter periods of Nov. 22, 1918, to Mar. 22, 1919, and Dec. 1, 1919, to Apr. 13, 1920.

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Monthly discharge of Boulder Creek near Boulder, Wyo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	63	5	27.5	1,690
November 1-21	51	22	36.6	1,520
March 23-31	21	18	19.6	350
April	82	4	32.7	1,950
May	1,900	54	551	33,900
June	700	25	178	10,600
July	25	6	9.4	578
August	6	3	3.7	228
September	3	3	3.0	179
1919-20				
October	69	4	49.8	3,060
November	68	40	55.0	3,270
April 14-30	95	82	84.7	2,860
May	1,160	87	339	20,800
June	1,880	490	1,140	67,800
July	700	90	313	19,200
August	81	16	35.5	2,180
September	16	9	11.1	660

NOTE.—See footnote to table of daily discharge.

FONTENELLE CREEK NEAR FONTENELLE, WYO.

LOCATION.—About sec. 3, T. 24 N., R. 113 W., at bridge at Holden's ranch, on stage road from Opal to Big Piney, 5 miles west of Fontenelle, Lincoln County. No important tributary between station and mouth.

DRAINAGE AREA.—224 square miles (measured on special map in Bulletin 543).

RECORDS AVAILABLE.—May 16, 1915, to September 30, 1919, when station was discontinued. State engineer maintained station at this point during 1914.

GAGE.—Vertical staff on downstream end of right abutment; read by Alfred Weber and Glen Frederick.

DISCHARGE MEASUREMENTS.—Made from single-span bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of coarse gravel; control is small rapids 100 feet below gage; practically permanent during 1919. Banks may overflow during extreme high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 0.76 foot at 1.30 p. m. April 24 (discharge, 138 second-feet); minimum discharge of approximately 1 second-foot occurred August 1 to September 2 and estimated for July 19–22 and 28.

1915–1919: Maximum stage recorded, 2.7 feet at 7 a. m. and 7 p. m., May 22, 1917 (discharge, 900 second-feet); minimum discharge occurred in 1919.

ICE.—Stage-discharge relation seriously affected by ice; observations discontinued during winter.

DIVERSIONS.—Prior to July 1, 1919, adjudicated diversions of 77 second-feet from Fontenelle Creek; percentage above station not known.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent; affected by ice during winter. Rating curve well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good except for days of missing gage heights for which they are approximate.

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Discharge measurements of Fontenelle Creek near Fontenelle, Wyo., during the year ending Sept. 30, 1919

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
June 20	J. B. Spiegel	0.07	15.8
Sept. 8	P. V. Hodges	−.06	5.2

Daily discharge, in second-feet, of Fontrnelle Creek at Fontenelle, Wyo., for the year ending Sept. 30, 1919

Day	Oct.	Nov.	Apr.	May	June	July	Aug.	Sept.
1	44	44	90	117	74	--------	10	1
2	47	44	90	117	66	--------	12	1
3	51	47	91	108	62	--------	12	2
4	47	47	95	108	66	--------	13	2
5	51	44	58	99	54	--------	15	2
6	58	44	51	99	40	--------	16	2
7	66	40	36	99	37	--------	18	4
8	54	37	34	99	37	--------	20	5
9	51	36	28	91	31	--------	22	8
10	47	36	34	91	26	--------	22	20
11	40	36	36	91	26	--------	22	20
12	40	44	36	86	25	--------	22	20
13	40	47	44	91	26	--------	25	20
14	40	47	40	91	26	--------	25	20
15	44	47	37	91	26	--------	25	20
16	47	44	51	78	26	--------	25	20
17	47	44	54	91	18	--------	25	20
18	51	44	86	95	15	--------	25	18
19	51	42	70	99	15	--------	25	18
20	47	40	122	117	16	--------	25	18
21	47	--------	122	122	15	--------	25	16
22	47	--------	117	122	15	--------	25	16
23	47	--------	132	117	12	--------	22	18
24	47	--------	138	117	10	--------	22	18
25	44	--------	122	99	10	--------	22	15
26	44	--------	117	95	10	--------	22	15
27	44	--------	108	78	9	--------	12	16
28	44	--------	117	74	8	--------	10	18
29	47	--------	117	74	8	--------	8	18
30	47	--------	117	78	8	12	4	18
31	47	--------	--------	74	--------	--------	1	--------

NOTE.—No gage-height record Apr. 1, 2, Aug. 1, 2, July 1-29, 31, and Aug. 27 to Sept. 5; discharge estimated as shown in table except for July 1 to 31, for which the mean discharge is estimated as 5 second-feet. Record discontinued Nov. 21 to Mar. 31.

Monthly discharge of Fontenelle Creek near Fontenelle, Wyo., for the year ending Sept. 30, 1919

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	66	40	47.4	2,910
November 1-30	47	36	42.7	1,690
April	138	28	79.7	4,740
May	132	74	97.7	6,010
June	74	8	27.2	1,620
July	--------	--------	[a] 5.0	307
August	25	1	12.6	1,140
September	20	1	13.6	809

[a] Estimated; see footnote to table of daily discharge.

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BLACKS FORK NEAR URIE, WYO.

LOCATION.—In sec. 23, T. 16 N., R. 115 W., at highway bridge 4 miles northwest of Urie, Uinta County. No tributary within 10 miles.

DRAINAGE AREA.—261 square miles (measured on United States Geological Survey map of Wyoming, scale 1:500,000).

RECORDS AVAILABLE.—August 21, 1913, to September 30, 1920.

GAGE.—Vertical staff on downstream side of center pier; read by Miss Myrtle Anderson. Datum lowered 0.50 foot August 19, 1915.

DISCHARGE MEASUREMENTS.—Made from two-span bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of well-compacted gravel. Control is small rapids just below bridge, which shifts slightly at long intervals. Right bank is high and not subject to overflow; left bank is overflowed at stage of about 3 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 2.6 feet at 9.30 a. m. and 7.30 p. m. May 29 (discharge, 680 second-feet); minimum stage recorded, 0.20 foot at 7 p. m. July 26 (discharge, 1.5 second-feet).

Maximum stage recorded during year ending September 30, 1920, 3.6 feet at 9 a. m. May 23 and 27 (discharge, 1,360 second-feet); minimum stage recorded, 0.36 foot at 9 a. m. August 23 and 25 (discharge, 5 second-feet).

1913–1920: Maximum stage recorded, 4.72 feet at 7 p. m. June 19 and 9 a. m. June 20, 1917 (discharge, 2,680 second-feet); minimum stage in 1919.

ICE.—Stage-discharge relation seriously affected by ice.

DIVERSIONS.—Prior to July 1, 1919, adjudicated diversions of 621 second-feet from Blacks Fork above station, and 4 second-feet below.

REGULATION.—None.

ACCURACY.—Stage-discharge relation slightly shifting. Rating curve well defined; applied indirectly for shifting control May 18 to June 22, 1920. Gage read to half-tenths twice daily during 1919 and to hundredths in 1920. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Blacks Fork near Urie, Wyo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft.*
Apr. 28	J. B. Spiegel	0.77	35.3
1920			
June 18	J. B. Spiegel	1.80	241
Sept. 30	P. V. Hodges	.65	21.2

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Daily discharge, in second-feet, of Blacks Fork near Urie, Wyo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19									
1	10	10	-------	35	27	27	6	6	3
2	10	10	-------	23	70	6	6	6.8	3
3	10	10	-------	17	136	49	6	6.8	4.5
4	10	10	-------	14	157	188	6	6	6
5	12	10	-------	14	184	74	6	6	5.4
6	20	15	-------	14	126	52	6	6	4.5
7	45	25	-------	14	117	40	6	4.5	4.5
8	38	25	-------	14	89	52	6	4.5	3
9	25	10	-------	14	94	52	6	4.5	3
10	37	12	-------	14	108	44	4.5	4.5	3
11	40	12	-------	21	78	52	8	5.4	3
12	26	10	-------	15	56	44	6	4.5	3
13	23	7	-------	20	108	31	3	4.5	3
14	18	10	-------	23	467	37	3	4.5	3
15	16	10	-------	15	467	31	3	3	3
16	16	10	-------	15	444	31	3	3	3
17	17	10	-------	15	420	27	3	4.5	3
18	35	10	-------	21	375	23	2.7	3.6	3
19	30	10	-------	21	375	23	2.2	2.7	3
20	25	10	-------	23	467	23	2.2	2.2	3
21	21	10	-------	21	543	18	2.2	2.2	3.9
22	18	10	-------	21	569	15	3.0	2.2	4.5
23	15	10	48	23	543	15	4.5	2.2	5.4
24	13	-------	48	17	467	10	3.6	2.7	6
25	11	-------	48	38	312	10	2.2	3	6
26	10	-------	61	46	354	9.2	1.8	3	6
27	10	-------	61	40	354	9.2	2.2	3	6
28	10	-------	48	29	569	6.8	2.2	3	6
29	11	-------	56	16	680	6.0	4.5	3	6
30	10		50	18	517	6.0	6	3	6
31	10	-------	44	-------	312	-------	6	3	-------
1919–20									
1	6	13	-------	61	124	1,130	30	14	13
2	6	10	-------	61	206	803	15	14	13
3	11	10	-------	61	124	543	15	14	13
4	13	10	-------	44	112	543	15	15	13
5	13	10	-------	61	108	596	15	22	16
6	11	10	-------	112	101	596	15	22	20
7	10	10	-------	101	101	836	15	22	20
8	10	10	-------	149	112	836	15	22	20
9	10	10	-------	206	124	836	15	22	20
10	10	10	-------	190	131	803	15	22	20
11	10	10	-------	131	162	517	15	22	20
12	10	10	-------	136	149	680	15	22	16
13	10	10	-------	124	184	332	15	22	16
14	10	10	-------	136	274	312	15	22	10
15	10	10	-------	124	238	312	15	14	8
16	10	-------	-------	131	274	274	15	14	8
17	10	-------	-------	124	312	238	23	14	8
18	10	-------	-------	74	420	238	23	17	8
19	10	-------	-------	80	569	238	22	32	12
20	10	-------	52	94	740	176	22	20	12
21	10	-------	80	80	940	162	16	12	12
22	10	-------	90	90	1,170	124	15	8	12
23	10	-------	101	67	1,010	112	22	5	12
24	10	-------	74	74	1,170	112	23	5	15
25	10	-------	61	61	1,090	112	35	6	15
26	11	-------	61	61	1,130	112	29	14	15
27	10	-------	52	86	1,130	52	23	14	15
28	10	-------	44	101	1,130	52	23	14	15
29	10	-------	44	112	975	52	29	14	15
30	10	-------	52	124	1,220	52	22	14	14
31	10	-------	61	-------	1,050	-------	15	12	-------

NOTE.—Records discontinued during winter Nov. 24, 1918, to Mar. 22, 1919, and Nov. 16, 1919, to Mar. 19, 1920.

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Monthly discharge of Blacks Fork near Urie, Wyo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	45	10	19.4	1,190
November 1–23	25	7	11.6	529
March 23–31	61	44	51.6	921
April	46	14	21.0	1,250
May	680	27	309	19,000
June	108	6	31.0	1,840
July	8.0	1.8	4.28	263
August	6.8	2.2	3.99	245
September	6.0	3.0	4.19	249
1919–20				
October	13	6	10.0	615
November 1–15	13	10	10.2	303
March 20–31	101	44	64.3	1,530
April	206	44	102	6,070
May	1,220	101	535	32,900
June	1,130	52	393	23,400
July	35	15	19.3	1,190
August	32	5	16.3	1,000
September	20	8	14.2	845

HAMS FORK AT DIAMONDVILLE, WYO.

LOCATION.—In SW. ¼ sec. 24, T. 21 N., R. 116 W., at highway bridge at Diamondville, Lincoln County. Nearest tributary, Willow Creek, enters 4 miles upstream.

DRAINAGE AREA.—383 square miles (measured on United States Geological Survey map of Wyoming, scale 1:500,000).

RECORDS AVAILABLE.—October 1, 1918, to September 30, 1920. From May 1 to September 30, 1918, station maintained at Kemmerer 2 miles upstream; records at two points comparable.

GAGE.—Vertical staff fastened to downstream end of center pier; read by O. L. Mosher, H. V. Collins, and George Kirkwood.

DISCHARGE MEASUREMENTS.—Made from two-span bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of small boulders and well-compacted gravel; permanent. Control located 200 feet downstream at small rapids composed of well-compacted gravel, which shifts slightly during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 2.9 feet at 5 p. m. April 30 (discharge, 690 second-feet); minimum discharge, stream dry August 29–31.

Maximum stage recorded during year ending September 30, 1920, 4.4 feet at 8 a. m. May 23 (discharge, 2,980 second-feet); minimum discharge probably occurred in the winter.

ICE.—Stage-discharge relation seriously affected by ice; observations discontinued during winter.

DIVERSIONS.—Prior to July 1, 1919, adjudicated diversions of 48 second-feet from Hams Fork above station and 112 second-feet below.

REGULATION.—None.

ACCURACY.—Stage-discharge relation shifted during high water of 1920. Rating curve used prior to May 28, 1920, well defined between 10 and 1,800 second-feet. Curve used from May 28, 1920, to September 30, 1920, well defined between 30 and 1,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, except from May 23 to 27, 1920, when shifting-control method was used and for periods of ice effect. Records good.

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Discharge measurements of Hams Fork at Diamondville, Wyo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
1918				1920			
Sept. 23[a]	P. V. Hodges	1.48	36.8	May 15	J. B. Spiegel	3.60	1,630
				June 13	do	3.21	830
1919				Aug. 4	P. V. Hodges	1.78	56
Mar. 9	do		21.5				
Apr. 27	J. B. Spiegel	2.54	401				
June 21	do	1.70	57				
Sept. 6	P. V. Hedges	1.16	12.4				

[a] Station established.

Daily discharge, in second-feet, of Hams Fork at Diamondville, Wyo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19										
1	32	43			440	600	370	25	15	1
2	38	41			456	520	405	21	15	3
3	40	40			405	480	370	19	16	1
4	40	38			305	405	161	16	16	4
5	40	34			318	370	161	16	18	15
6	45	34			200	370	161	16	16	14
7	45	34			161	338	161	14	16	14
8	45	32			105	305	200	12	15	15
9	45	32		22	87	305	161	11	15	14
10	40	32			80	305	128	9	15	15
11	40	32			87	338	122	9	16	14
12	40	32			94	305	128	8	16	14
13	40	32			87	294	122	7	16	14
14	40	30			66	294	122	6	16	13
15	40	30			55	305	128	5	14	11
16	40	30			66	338	99	5	12	12
17	40	30			87	357	87	5	12	12
18	36	30			122	370	87	5	11	14
19	36	30			305	384	66	5	10	15
20	38	30			366	405	66	5	9	14
21	40	30			294	405	57	6	8	13
22	40				318	426	55	10	7	15
23	38				370	440	50	9	6	14
24	38			57	480	440	46	9	5	16
25	38			57	520	440	36	8	4	16
26	38			57	520	440	35	7	3	16
27	38			71	440	426	34	6	2	16
28	36			75	456	405	33	5	1	20
29	36			80	504	405	31	10	0	23
30	36			114	600	384	27	15	0	22
31	43			243		384		15	0	

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Daily discharge, in second-feet, of Hams Fork at Diamondville, Wyo., for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Dec.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919-1920										
1	26	38	35	--------	41	490	1,380	241	46	36
2	26	37	35	--------	38	560	1,210	212	46	33
3	32	36	33	--------	35	560	995	181	53	32
4	35	38	37	--------	36	645	930	166	58	28
5	34	40	38	--------	36	780	875	148	49	28
6	33	40	40	--------	40	1,020	820	139	46	30
7	31	37	40	--------	68	1,070	930	121	44	36
8	30	38	40	--------	144	1,140	930	110	41	40
9	32	40	41	--------	200	1,220	930	98	43	40
10	31	40	41	--------	248	1,290	995	87	40	35
11	31	43	42	--------	169	1,220	995	75	36	34
12	30	43	43	--------	192	1,220	930	71	35	30
13	32	40	44	--------	188	1,220	820	68	36	30
14	31	38	--------	46	205	1,450	772	59	38	27
15	33	37	--------	47	248	1,540	725	55	35	26
16	32	38	--------	46	188	1,370	725	57	34	28
17	31	38	--------	51	180	1,620	682	62	33	28
18	32	36	--------	47	184	1,790	640	62	31	28
19	35	36	--------	45	144	2,040	555	56	33	26
20	34	36	--------	42	122	2,130	518	55	34	26
21	34	39	--------	40	105	2,040	480	51	33	26
22	34	40	--------	57	102	2,300	405	52	34	28
23	33	40	--------	57	99	2,640	405	53	35	31
24	34	37	--------	56	77	2,040	392	52	32	39
25	36	33	--------	49	111	1,880	372	56	29	44
26	37	35	--------	47	141	1,790	360	53	26	45
27	39	34	--------	46	154	1,540	318	49	28	45
28	40	33	--------	45	248	1,380	290	50	36	49
29	47	35	--------	38	276	1,380	285	51	44	44
30	47	33	--------	39	405	1,380	290	50	46	44
31	46	--------	--------	43	--------	1,380	--------	45	39	--------

NOTE.—Stage-discharge relation affected by ice Nov. 14-21, 1918; discharge estimated. No gage-height record Aug. 19-30, 1919; discharge interpolated. Record discontinued from Nov. 22, 1918, to Mar. 23, 1919 and Dec. 14, 1919, to Mar. 13, 1920.

Monthly discharge of Hams Fork at Diamondville, Wyo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	45	32	39.4	2,420
November 1-21	43	30	33.1	1,380
April	600	55	277	16,500
May	600	294	386	23,700
June	405	27	123	7,320
July	25	5	10.3	633
August	18	0	10.5	646
September	23	1	13.3	791
1919-20				
October	47	26	34.2	2,100
November	43	33	37.6	2,240
December 1-13	44	33	39.2	1,010
March 14-31	57	38	46.7	1,670
April	405	35	147	8,750
May	2,640	480	1,420	87,300
June	1,380	280	698	41,500
July	241	45	86.6	5,320
August	53	26	38.3	2,360
September	49	26	33.9	2,020

97418—25†—WSP 509——10

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LITTLE SNAKE RIVER NEAR DIXON, WYO.

LOCATION.—In sec. 6, T. 12 N., R. 90 W., at highway bridge 1 mile west of Dixon, Carbon County. No important tributary within several miles.

DRAINAGE AREA.—1,060 square miles (measured on United States Geological Survey map of Wyoming, scale 1: 500,000).

RECORDS AVAILABLE.—May 27, 1910, to September 30, 1920 (records, 1914-1916 published in Water-Supply Paper 469).

GAGE.—Chain gage on upstream side of bridge; read by Mrs. W. N. Rogers and Mrs. J. E. Herold.

CHANNEL AND CONTROL.—Slightly shifting during high water.

COOPERATION.—Complete records furnished by State engineer of Colorado.

Discharge measurements of Little Snake River near Dixon, Wyo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft*	1920		*Feet*	*Sec.-ft.*
May 6	B. T. Chase	5.18	3,340	June 9	B. T. Chase	6.78	5,860
June 6	do	3.29	1,420	July 1	do	3.25	1,200
July 20	do	.80	8.5				
Aug. 21	do	.74	7.0				

Daily discharge, in second-feet, of Little Snake River near Dixon, Wyo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918-19									
1	60	155	.....	1,820	3,140	2,510	161	43	6
2	70	155	.....	1,560	3,060	2,040	97	30	6
3	64	155	.....	1,460	2,620	1,920	97	28	24
4	80	170	.....	1,460	2,780	1,640	97	30	8
5	381	170	.....	1,690	2,840	1,460	90	38	8
6	80	149	.....	1,220	2,980	1,380	85	13	7
7	155	125	.....	741	3,060	1,380	71	10	6
8	125	105	.....	534	2,670	1,380	38	6	6
9	100	131	.....	471	2,410	1,420	30	6	6
10	125	140	.....	553	2,310	1,420	13	7	6
11	140	125	.....	566	2,360	1,400	13	6	6
12	100	105	.....	411	2,420	1,400	8	6	6
13	100	120	.....	553	2,560	1,220	6	8	8
14	100	105	.....	515	2,690	1,220	6	6	6
15	100	131	.....	411	2,460	1,220	8	5	8
16	80	120	.....	440	2,560	1,100	7	6	16
17	80	125	.....	534	3,060	1,060	8	6	12
18	90	149	.....	1,100	3,260	900	10	6	12
19	100	125	.....	1,760	3,300	764	13	6	8
20	90	140	.....	2,140	2,840	688	5	6	8
21	80	149	.....	2,280	3,420	619	10	6	13
22	80	131	.....	2,670	3,240	502	10	6	8
23	90	131	1,870	2,460	3,340	428	8	6	13
24	80	96	1,490	3,960	3,380	354	16	6	10
25	80	.....	1,020	3,620	3,300	220	8	6	16
26	90	.....	702	3,900	3,240	180	8	6	8
27	90	.....	820	3,300	3,060	180	8	6	8
28	100	.....	1,020	2,840	3,100	195	13	6	20
29	100	.....	1,300	2,980	3,020	170	13	6	85
30	125	.....	1,870	3,180	3,000	133	16		170
31	125	.....	1,960	.....	2,720	.....	16		.....

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Daily discharge, in second-feet, of Little Snake River near Dixon, Wyo., for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919–20									
1	230	124	.....	155	860	6,840	1,280	76	100
2	283	133	.....	155	1,780	5,670	900	76	88
3	337	124	.....	155	1,700	5,400	900	56	88
4	283	147	.....	155	1,950	5,220	680	76	76
5	230	147	.....	172	2,480	5,040	680	76	76
6	180	147	.....	210	2,680	5,040	500	72	76
7	147	133	.....	230	3,320	5,400	500	60	76
8	97	124	.....	340	3,590	5,490	440	56	76
9	85	133	.....	470	4,150	5,580	380	66	105
10	66	133	.....	715	5,490	5,490	380	56	88
11	66	133	.....	860	5,490	3,800	330	56	81
12	66	147	.....	884	5,400	3,800	280	56	81
13	66	133	.....	820	5,670	3,800	280	56	81
14	71	133	.....	1,060	6,120	3,800	280	56	81
15	71	133	.....	1,060	6,120	3,800	280	56	76
16	71	.....	.....	1,180	5,940	3,800	280	76	66
17	90	.....	.....	1,060	5,940	2,920	155	76	66
18	90	.....	.....	500	6,660	2,920	155	81	76
19	90	.....	.....	470	7,640	2,860	210	88	76
20	107	.....	.....	470	7,860	2,860	190	76	66
21	97	.....	.....	410	7,640	2,500	155	100	66
22	117	.....	.....	470	8,300	2,480	155	112	76
23	124	.....	.....	440	8,960	2,420	155	100	76
24	124	.....	.....	380	8,300	2,360	100	76	88
25	147	.....	.....	330	8,300	2,360	100	76	100
26	147	.....	.....	410	8,300	2,120	100	76	149
27	133	.....	.....	380	7,200	1,060	100	76	162
28	133	.....	.....	380	7,200	1,060	125	76	172
29	147	.....	.....	410	7,200	1,600	125	100	162
30	133	.....	.....	620	7,200	1,410	100	100	190
31	133	.....	.....	.....	7,200	.....	100	100	.....

NOTE.—Records discontinued during winter.

Monthly discharge of Little Snake River near Dixon, Wyo., for the years ending Sept. 30, 1919 and 1920

Month.	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	381	60	105	6,460
November 1–24	170	96	134	6,280
March 22–31	1,960	702	1,340	23,900
April	3,960	411	1,700	101,000
May	3,420	2,310	2,910	179,000
June	2,510	133	1,020	60,700
July	161	5	31.9	1,960
August	43	5	10.9	670
September	170	6	17.5	1,040
1919–20				
October	337	66	134	8,240
November 1–15	147	124	135	4,020
April	1,180	155	512	30,500
May	8,960	860	5,700	350,000
June	6,840	1,060	3,630	216,000
July	1,230	100	330	20,300
August	112	56	75.5	4,640
September	190	66	94.7	5,640

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SAVERY CREEK AT SAVERY, WYO.

LOCATION.—About in sec. 8, T. 12 N., R. 89 W., half a mile east of Savery, in Carbon County. No tributary between station and mouth, 1½ miles below.

DRAINAGE AREA.—354 square miles (measured on United States Geological Survey map of Wyoming, scale 1:500,000).

RECORDS AVAILABLE.—May 1, 1915, to September 30, 1916; April 5, 1918, to September 30, 1920.

DIVERSIONS.—Prior to July 1, 1919, adjudicated diversions of 64 second-feet from Savery Creek.

REGULATION.—None.

COOPERATION.—Complete records furnished by State engineer of Colorado.

Discharge measurements of Savery Creek at Savery, Wyo., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft.*	1919		*Feet*	*Sec.-ft.*
Apr. 4	B. T. Chase	3.30	588	July 27	B. T. Chase	0	0
May 6	do	3.10	510	1920			
June 6	do	1.95	130	June 9	B. T. Chase	3.15	520
June 25	do	.92	14	July 1	do	1.55	68

Daily discharge, in second-feet, of Savery Creek at Savery, Wyo., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19									
1	24	24		870	630	254	2		
2	24	31		810	550	254	2		
3	24	39		690	470	228	2		
4	49	39		630	434	220	2		
5	63	39		630	470	152	2.5		
6	24	44		710	470	140	3		
7	31	44		237	470	130	3		
8	28	49		140	398	120	3		
9	24	49		130	362	120	3		
10	31	49		130	362	120	3		
11	39	56		140	362	120	3		
12	49	63		140	326	120	3		
13	63	63		130	326	120	3		
14	49	63		140	326	120	2		
15	28	49		111	326	130	2		
16	24	63		130	326	111	2		
17	18	79		140	326	86	2		
18	24	63		398	326	60	2		
19	31	63		670	326	55	2		
20	39	49		670	344	40			
21	31	31		830	362	28			
22	31			830	380	24			
23	24			750	398	21			
24	18			790	398	18			
25	18			870	344	13			
26	21			870	290	11			
27	18		830	710	254	9			
28	24		850	650	190	9			
29	28		830	630	220	5			
30	31		790	630	254	2			6
31	24		870		190				

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Daily discharge, in second-feet, of Savery Creek at Savery, Wyo., for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919-20									
1	24	18			434	908	69	4	9
2	24	24			650	650	36	3	9
3	40	24			908	566	24	3	9
4	55	24			1,350	506	24	3	6
5	60	24			908	506	24	13	6
6	79	24			1,220	506	24	13	6
7	86	24			1,350	525	24	9	6
8	102	24			1,050	542	18	9	6
9	102	24		72	1,100	578	13	3	3
10	102	21		290	1,100	578	6	2	3
11	102	21		290	1,350	578	6	2	4
12	140	24		220	1,650	506	6	2	4
13	140	24		290	1,650	506	4	2	4
14	102	24		470	1,150	506	4	2	6
15	60	18		650	1,100	506	4	2	6
16	28	18		650	1,100	398	4	3	6
17	18	28		140	1,200	398	4	3	9
18	18	36		120	1,710	290	4	3	9
19	18	40		120	1,770	190	4	6	9
20	18	50		120	1,650	190	4	6	9
21	24	50		120	1,770	164	4	6	
22	24	50		120	1,770	102	4	6	16
23	24	50		120	1,100	60	4	3	24
24	24	50		120	1,100	60	4	3	24
25	32	50		120	1,100	60	4	3	24
26	40	50		120	1,000	60	4	6	24
27	40	50		120	956	50	4	6	24
28	28	50		120	956	50	4	6	24
29	24	50		140	860	50	4	6	40
30	21	50		164	860	50	4	9	40
31	21				860		4	9	

NOTE.—No flow July 20, 1919, to Sept. 29, 1919. Records discontinued during winter.

Monthly discharge of Savery Creek at Savery, Wyo., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	63	18	30.8	1,890
November 1-21	79	24	30.0	2,080
March 27-31	870	790	834	8,280
April	870	111	507	30,200
May	630	190	362	22,300
June	254	2	94.4	5,620
July	3	0	1.50	92.2
August	0	0	0	0
September	6	0	.02	11.9
1919-20				
October	140	18	52.3	3,220
November	50	18	33.8	2,010
April 9-30	650	72	213	9,290
May	1,770	434	1,180	72,600
June	908	50	353	21,000
July	60	4	11.0	676
August	13	2	5.0	307
September	40	3	12.6	750

ASHLEY CREEK NEAR VERNAL, UTAH

LOCATION.—In sec. 12, T. 3 S., R. 20 E., three-quarters of a mile above heading of power canal of Vernal Milling & Light Co., 4 miles above mouth of Dry Fork, and 12 miles northwest of Vernal, Uinta County.

DRAINAGE AREA.—101 square miles (measured on topographic map).

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RECORDS AVAILABLE.—June 6, 1914, to September 30, 1920. From October 8, 1911, to June 5, 1914, fragmentary records were obtained at the power plant, the total flow of the creek being determined by including the discharge from the tailrace. Records are also available for a point below the mouth of Dry Fork from March 15, 1900, to December 31, 1904.

GAGE.—Stevens continuous water-stage recorder on left bank three-quarters of a mile above heading of power canal, installed June 14, 1919, to replace Gurley eight-day recorder previously used. Recorders inspected and supplementary staff gage read once a week by William Mort and Parley Merkeley.

DISCHARGE MEASUREMENTS.—Made from cable at power plant or by wading near gage.

CHANNEL AND CONTROL.—Bed steep and rough; subject to change during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year ending September 30, 1919, 4.20 feet on May 10 (discharge, 278 second-feet). Minimum stage recorded, 3.30 feet on February 8 and 15 (discharge, 27 second-feet).

Maximum stage recorded during the year ending September 30, 1920, 7.05 feet at 7.20 p. m. May 28 (discharge, 1,360 second-feet). Minimum stage recorded, 3.36 feet on February 7 (discharge, 26 second-feet).

1911–1920: Maximum and minimum discharge recorded occurred in 1920, but the unrecorded maximum of June 24, 1917, was probably greater.

ICE.—None.

DIVERSIONS.—None above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not affected by ice. Changes in channel conditions caused slight changes in stage-discharge relation April 26, June 14, and November 29, 1919. A radical change occurred during the high-water period May 24 to June 10, 1920. Rating curves fairly well defined. From October 1, 1918, to June 13, 1919, the only gage-height record obtained was weekly staff gage readings. After that date water-stage recorder was in operation except for periods July 28, to August 1, October 6–10, November 9–15, 27–28, 30, and December 1–20, 1919, and February 8–14, 1920. Daily discharge determined only for days when gage was read during the period October 1, 1918, to June 13, 1919. After that period, daily discharge ascertained by applying to rating table the mean daily gage height determined from recorder graph, and by interpolating for days when recorder was not in operation. Records fair.

Discharge measurements of Ashley Creek near Vernal, Utah, during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
1918 Nov. 5	L. W. Jordan	3.56	64	1919 Sept. 25	Rush and Purton	3.48	53
1919 Jan. 24	do	3.34	31.9	1920 Mar. 17	W. E. Dickinson	3.38	28.4
May 12	do	3.96	200	May 28	A. B. Purton	6.10	856

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Daily discharge, in second-feet, of Ashley Creek near Vernal, Utah, for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	
1918–19												
1					32	29				80	60	39
2		67								80	61	39
3								244		77	61	39
4				37						75	59	39
5	80	67					39			73	59	38
6										71	59	37
7			39						150	71	59	39
8					32	27				71	57	47
9		55								71	55	49
10								278		69	53	47
11				37						63	52	45
12	75						29	200		59	52	45
13										61	49	45
14			39						97	63	49	44
15					32	27			97	61	47	44
16		55							97	61	49	44
17								244	94	61	49	49
18				34					92	59	47	52
19	75						42		89	59	45	52
20									89	59	44	53
21			39						89	57	42	55
22					29	29			92	57	42	55
23		49							89	57	42	55
24				32				212	85	55	44	57
25				32					82	55	44	57
26	67						186		80	55	42	57
27									82	53	42	57
28			37						80	54	42	61
29						34			82	56	41	71
30		45							80	57	41	71
31								180		58	39	
1919–20												
1	65	53		33	29	28	31	37	980	186	99	69
2	65	52		33	29	28	31	41	800	172	94	68
3	65	49		33	28	28	31	42	740	157	92	68
4	65	49		33	27	28	31	44	720	163	92	68
5	65	45		33	27	28	29	52	760	141	88	69
6		44		33	27	28	28	67	810	135	90	70
7		42		33	26	28	28	92	860	130	83	69
8	66	41		33		28	28	132	910	122	77	69
9				33		28	29	192	840	115	85	69
10				33		28	29	196	720	112	81	69
11	67		30	33	30	28	29	183	615	110	76	69
12	67	41		33		28	29	218	560	108	72	69
13	65			33		28	29	248	550	101	70	68
14	65			33		28	28	248	550	94	69	64
15	63			33	33	28	28	244	530	92	68	62
16	63	41		33	33	28	29	278	425	94	68	60
17	63	41		33	33	28	31	432	384	115	68	60
18	63	41		33	32	28	29	595	348	99	69	58
19	63	41		33	31	28	29	655	316	99	74	57
20	63	42		33	31	28	29	691	296	94	74	57
21	63	42	33	33	31	28	29	659	276	90	72	57
22	63	42	33	33	29	28	29	760	268	90	72	57
23	63	42	33	33	28	28	29	730	264	99	72	58
24	63	42	33	33	27	28	31	880	248	97	70	62
25	63	42	33	33	27	28	31	1,140	236	101	70	64
26	63	42	33	33	28	28	31	1,050	215	108	70	70
27	61	42	33	32	28	28	31	1,050	218	94	70	70
28	59	42	33	32	28	29	31	1,060	229	90	76	69
29	57	42	33	31	28	29	32	1,100	204	99	72	69
30	55	42	33	31		29	33	1,110	218	86	70	68
31	55		33	31		31		1,060		88	69	

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Monthly discharge of Ashley Creek near Vernal, Utah, for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October			[a] 75	4,610
November			[a] 55	3,270
December			[a] 40	2,460
January			[a] 35	2,150
February			[a] 30	1,670
March			[a] 30	1,840
April			[a] 75	4,460
May			[a] 225	13,800
June		80	[a] 115	6,840
July	80	53	63.2	3,890
August	61	39	49.3	3,030
September	71	37	49.4	2,940
The year			[a] 70	51,000
1919–20				
October	67	55	63.3	3,880
November	53		42.9	2,550
December			31.1	1,910
January	33	31	32.7	2,010
February	33	26	29.3	1,600
March	31	28	28.2	1,730
April	33	28	29.7	1,770
May	1,140	37	493	30,300
June	980	204	503	29,900
July	186	86	112	6,890
August	99	68	76.2	4,600
September	70	57	65.2	3,880
The year	1,140	26	126	91,200

[a] Estimated.

VERNAL MILLING & LIGHT CO.'S TAILRACE NEAR VERNAL, UTAH

LOCATION.—In sec. 18, T. 3 S., R. 21 E., at power plant of Vernal Milling & Light Co., 10 miles northwest of Vernal, Uinta County.

RECORDS AVAILABLE.—May 3 to September 30, 1917, and March 18 to September 30, 1920.

GAGE.—Indicating gage in office of power plant actuated by float in stilling well in tailrace beneath plant; also vertical enamel staff in stilling well; established March 17, 1920. Vertical staff nailed to tree on right bank 10 feet below footbridge at lower side of power house, May 3, 1917, to March 17, 1920.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel straight for 50 feet below gage. Banks high and one channel at all stages. Bed of gravel and small boulders. Fairly permanent.

ICE.—None.

ACCURACY.—Stage-discharge relation changed somewhat during summer of 1920. Rating curve based on measurements made on March 18, well defined and used as standard curve for remainder of year. Shifting-control method used April to September, 1920. Beginning March 18, 1920, gage read hourly to hundredths and reading made a part of hourly record of the power plant. Prior to that date readings on former gage were infrequent and were not a true index of mean stage. Daily discharge ascertained by applying mean daily gage height to rating table except for days when plant was not operated continuously. For these days hourly discharge was used to determine the daily mean. Discharge not determined October 1, 1917, to March 17, 1920. Records fair for remainder of 1920.

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Discharge measurements of Vernal Milling and Light Co.'s tailrace near Vernal, Utah, during the period Oct. 1, 1917, to Sept. 30, 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1918		*Feet*	*Sec.-ft.*	1920		*Feet*	*Sec.-ft.*
Feb. 13	J. J. Sanford	1.18	23.8	Mar. 16	W. E Dickinson	1.01	21.8
Apr. 21	R. P. Flagel	.90	15.2	18	do	4.35	19.6
June 17	A. B. Purton	.98	17.1	18	do	3.85	4.5
Aug. 4	J. W. Bones	.45	2.8	18	do	3.83	4.0
Nov. 5	L. W. Jordan	.94	20.8	18	do	4.25	16.5
1919				18	do	4.64	30.8
Jan. 24	do	1.25	29.8	May 27	A. B. Purton	4.31	17.6
May 12	do	1.10	27.1				
Sept. 25	Rush and Purton	.99	20.9				

NOTE.—New gage installed Mar. 17, 1920.

Daily discharge, in second-feet, of Vernal Milling & Light Co.'s tailrace near Vernal, Utah, for the period Mar. 18 to Sept. 30, 1920

Day	Mar.	Apr.	May	June	July	Aug.	Sept.
1		22	22	23	24	19	23
2		22	20	24	23	21	23
3		22	22	24	22	22	24
4		21	22	24	21	21	23
5		22	21	24	20	22	13
6		23	22	20	21	22	21
7		23	22	23	21	23	24
8		24	22	22	22	9	23
9		24	20	24	23	23	23
10		14	20	23	22	24	23
11		5	22	24	20	23	24
12		22	21	24	21	23	12
13		23	21	10	22	24	23
14		22	23	22	23	22	23
15		22	23	22	24	9	24
16		22	19	22	10	23	23
17		18	21	22	21	22	23
18	23	7	23	22	18	23	23
19	24	23	22	22	22	24	12
20	23	22	22	20	18	20	22
21	21	23	23	23	22	23	24
22	24	22	22	18	23	12	24
23	24	22	19	22	21	23	24
24	24	22	21	23	20	19	24
25	24	20	22	23	19	23	24
26	24	22	22	23	21	24	13
27	23	22	22	20	22	20	23
28	21	24	22	24	23	23	24
29	24	22	21	24	24	18	24
30	22	22	19	24	22	22	23
31	24		22		22	22	

Monthly discharge of Vernal Milling & Light Co.'s tailrace near Vernal, Utah, for the period Mar. 18 to Sept. 30, 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
March 18–31	24	21	23.2	643
April	24	5	20.8	1,240
May	23	19	21.4	1,320
June	24	10	22.2	1,320
July	24	10	21.2	1,300
August	24	9	20.9	1,290
September	24	12	21.9	1,300
The period				8,410

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DUCHESNE RIVER NEAR TABIONA, UTAH

LOCATION.—In SW. ¼ sec. 17, T. 2 S., R. 6 W., Uinta special base and meridian, at highway bridge 8 miles southeast of Tabiona, Duchesne County, 5½ miles above Rock Creek.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 16, 1919, to September 30, 1920.

GAGE.—Stevens tape gage on downstream side of bridge; installed March 8, 1920; read by E. L. Brown and Lyman Duke. From January 16, 1919, to March 8, 1920, a graduated rod was used at same point to measure down to water surface from a mark on bridge truss.

DISCHARGE MEASUREMENTS.—Made by wading or from bridge.

CHANNEL AND CONTROL.—Channel composed of gravel and sand. Left bank high and not subject to overflow. Right bank may be overflowed at extreme high water allowing water to pass around bridge. Control is gravel riffle. Zero flow at gage height 0.9 foot as determined on September 21, 1919.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 12.74 feet on May 24 (discharge, 1,420 second-feet). Minimum discharge probably less than 70 second-feet in January when river was frozen over.

Maximum stage recorded during year ending September 30, 1920, 13.53 feet on June 9 (discharge, 1,900 second-feet). Minimum discharge probably less than 80 second-feet in January when river was frozen over.

1919–1920: Maximum stage recorded, 13.53 feet on June 9, 1920 (discharge, 1,900 second-feet). Minimum discharge probably less than 70 second-feet in January, 1919, when river was frozen over.

ICE.—River freezes over each winter.

DIVERSIONS.—Some small diversions for irrigation above this station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during high water on May 31, 1920; affected by ice January 16 to February 2, 1919, and December 2, 1919, to February 7, 1920. Rating curves fairly well defined. Gage read to tenths once a day January 16, 1919, to March 7, 1920, and to hundredths once a day thereafter. Daily discharge ascertained by applying daily gage height to rating table. Discharge for periods of ice effect estimated from meter measurements, observer's notes, temperature records, and comparison with flow of Duchesne River at Duchesne. Records good.

Discharge measurements of Duchesne River near Tabiona, Utah, during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft.*	1920		*Feet*	*Sec.-ft.*
Jan. 16	L. W. Jordan	10.62	* 96	Mar. 8	W. E. Dickinson	9.28	94
May 17	do	11.60	813	May 22	A. B. Purton	12.15	1,100
Sept. 21	Rush and Purton	9.54	130				
Dec. 9	A. B. Purton	9.45	* 91				

* Stage-discharge relation affected by ice.

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Daily discharge, in second-feet, of Duchesne River near Tabiona, Utah, for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	-------	-------	-------	-------	75	102	167	374	785	131	74	61
2	-------	-------	-------	-------	75	88	188	444	626	131	81	55
3	-------	-------	-------	-------	74	81	167	481	561	116	74	131
4	-------	-------	-------	-------	88	74	167	561	521	109	81	49
5	-------	-------	-------	-------	88	88	148	603	561	109	74	61
6	-------	-------	-------	-------	102	88	167	541	561	102	74	51
7	-------	-------	-------	-------	102	88	131	561	541	102	74	102
8	-------	-------	-------	-------	88	74	131	521	444	102	81	88
9	-------	-------	-------	-------	88	88	116	561	444	102	88	88
10	-------	-------	-------	-------	95	88	124	561	462	102	88	102
11	-------	-------	-------	-------	88	74	116	561	444	102	88	102
12	-------	-------	-------	-------	88	88	124	521	409	102	81	109
13	-------	-------	-------	-------	74	102	116	603	374	102	81	109
14	-------	-------	-------	-------	88	102	124	603	374	95	61	116
15	-------	-------	-------	-------	95	88	116	693	312	95	68	109
16	-------	-------	-------	96	88	88	116	785	312	95	68	131
17	-------	-------	-------		95	88	131	845	285	95	68	116
18	-------	-------	-------		102	102	148	935	285	95	68	116
19	-------	-------	-------		102	102	139	985	260	95	68	131
20	-------	-------	-------		88	188	167	1,090	248	88	68	116
21	-------	-------	-------		95	167	188	1,120	211	88	68	131
22	-------	-------	-------		81	139	211	1,200	211	88	68	131
23	-------	-------	-------		102	148	260	1,370	199	88	68	131
24	-------	-------	-------	85	74	124	260	1,420	188	88	68	131
25	-------	-------	-------		88	139	312	1,310	177	88	61	116
26	-------	-------	-------		88	131	312	1,090	167	88	61	116
27	-------	-------	-------		88	139	285	1,200	157	88	61	116
28	-------	-------	-------		88	148	260	1,200	148	81	61	131
29	-------	-------	-------		-------	167	285	1,200	139	74	61	167
30	-------	-------	-------		-------	167	312	1,150	131	68	61	211
31	-------	-------	-------		-------	188	-------	935	-------	68	61	-------
1919–20												
1	148	120				102	109	165	1,670	530	202	172
2	139	122				102	112	225	1,420	490	168	127
3	148	124				95	89	238	1,250	498	202	125
4	143	122			90	95	108	250	1,240	457	215	122
5	139	124	110			102	113	262	1,290	425	202	148
6	139	120				95	125	275	1,520	370	179	168
7	136	124				95	125	330	1,760	417	168	168
8	139	124			95	88	154	385	1,840	338	132	168
9	131	116	91		95	88	155	451	1,900	332	132	168
10	135	116			95	110	163	541	1,760	309	130	162
11	131	116			88	110	133	412	1,440	290	135	156
12	131	116			88	96	138	505	1,390	271	143	148
13	139	106			81	110	146	525	1,400	268	127	143
14	131	106			81	125	141	553	1,300	265	122	141
15	131	109			81	110	145	541	1,130	265	125	139
16	131	109		80	88	109	146	545	1,030	318	127	137
17	131	106			88	110	133	608	940	283	122	134
18	131	116			88	109	125	742	950	283	127	148
19	120	116			95	109	125	855	965	254	168	146
20	120	120	85		102	110	128	1,040	930	245	179	141
21	124	124			95	119	124	1,180	790	239	148	137
22	124	124			95	110	118	1,160	790	215	150	137
23	124	124			95	110	113	1,340	765	215	130	158
24	124	120			88	104	113	1,210	690	215	130	148
25	120	120			88	104	125	1,380	690	218	134	154
26	124	124			95	110	125	1,370	665	192	172	156
27	120	116			95	110	133	1,400	642	179	154	154
28	124	109			102	109	139	1,480	530	179	154	148
29	131	109			95	109	154	1,590	620	179	158	146
30	124	102			-------	110	157	1,730	642	162	158	134
31	124	-------			-------	110	-------	1,850	-------	158	148	-------

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Monthly discharge of Duchesne River near Tabiona, Utah, for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
January 16–31			85.7	2,720
February	102	74	88.8	4,980
March	188	74	114	7,010
April	312	116	183	10,900
May	1,420	374	842	51,800
June	785	131	351	20,900
July	131	68	96.0	5,900
August	88	61	71.2	4,380
September	211	49	111	6,600
The period				115,000
1919–20				
October	148	120	131	8,060
November	124	102	117	6,960
December			91.4	5,620
January			80.0	4,920
February	102		91.1	5,240
March	125	88	106	6,520
April	163	89	130	7,740
May	1,850	165	811	49,900
June	1,900	530	1,130	67,200
July	530	158	292	18,000
August	215	122	153	9,410
September	172	122	148	8,810
The year	1,900		273	198,000

DUCHESNE RIVER AT DUCHESNE, UTAH

LOCATION.—In SE. ¼ sec. 1, T. 4 S., R. 5 W., half a mile north of post office at Duchesne, Duchesne County, at bridge on road from Duchesne to Tabiona, a quarter of a mile above mouth of Strawberry River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 3, 1917, to September 30, 1920.

GAGE.—Chain gage on downstream handrail of bridge near right bank; read by E. S. Winslow.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Banks are subject to erosion but not to overflow. One channel at all except low stages, when a bar under the bridge is exposed making at the gage two channels which reunite a few feet downstream. At extreme low water there probably is no flow under the gage, but a pool remains as backwater from the stream at the control. The control is formed by a long, heavy, gravel riffle a short distance below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 6.85 feet at 6 p. m. May 29 (discharge, 2,180 second-feet). Minimum stage recorded, 3.80 feet July 29 and August 23–27 (discharge, 53 second-feet).

Maximum stage recorded during year, 7.4 feet on June 10 (discharge, 2,820 second-feet). Minimum discharge not determined. It was probably less than 150 second-feet in the winter.

1918–1920: Maximum discharge, 2,820 second-feet occurred on June 10, 1920. Minimum discharge, 53 second-feet, occurred July 29 and August 23–27, 1919.

ICE.—Stream freezes over every winter.

DIVERSIONS.—Below all diversions above mouth of Strawberry River, numerous diversions below station. Rock Creek enters between this station and the station near Tabiona.

REGULATION.—None except by diversion.

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ACCURACY.—Stage-discharge relation changed during high water about May 30, 1919, and June 10, 1920; affected by ice December 12, 1918, to March 18, 1919, November 27–28, and 30, 1919, and December 3, 1919, to March 4, 1920. Rating curves fairly well defined. Gage read to half-tenths twice a day except October 6–15, 1918, when it was not read, and January 12 to March 31, 1920, when it was read three times a week. Daily discharge ascertained by applying mean daily gage height to rating table except as follows. Discharge October 6–15, 1918, estimated. Discharge for periods of ice effect estimated from meter measurements, study of weather records, observer's notes, and hydrographic study of flow at this station in conjunction with that of Duchesne River at Myton, Strawberry River at Duchesne, and Lake Fork near Myton. Discharge interpolated for days in March, 1920, when gage was not read. Records good.

Discharge measurements of Duchesne River at Duchesne, Utah, during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1918		*Feet*	*Sec.-ft.*	1919		*Feet*	*Sec.-ft.*
Oct. 31	Bones and Jordan	4.56	316	Dec. 8	A. B. Purton	* 4.45	210
1919				1920			
Jan. 15	L. W. Jordan	* 6.65	195	Mar. 6	W. E. Dickinson	4.37	186
May 17	do	6.11	1,390	24	do	4.30	174
Sept. 21	Rush and Purton	4.39	202	May 31	A. B. Purton	7.38	2,800

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Duchesne River at Duchesne, Utah, for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	207	291	238				291	533	1,300	241	134	90
2	216	310	255				299	628	1,140	241	163	126
3	222	291	291				291	692	1,060	222	282	176
4	255	291	310				262	719	992	222	163	169
5	330	291	273				273	862	920	203	139	176
6		291	273				262	789	938	196	126	186
7		291	273				248	760	1,080	186	113	233
8		291	255	170			222	760	1,030	176	113	241
9		291	273				216	760	1,030	145	126	233
10		291	255			195	216	740	1,030	139	163	222
11	350	291	238				207	719	1,030	134	139	222
12		291					216	705	938	126	126	222
13		291					222	774	852	126	113	203
14		284					216	940	771	145	95	186
15		262		195	200		207	1,120	695	134	90	222
16	210	255					207	1,240	695	126	80	222
17	418	255					198	1,380	680	139	80	211
18	468	238					216	1,460	624	154	80	211
19	395	248				207	229	1,660	531	126	80	203
20	351	255				273	262	1,900	483	113	74	196
21	330	262	190			310	284	2,030	472	102	74	208
22	330	255				273	330	2,100	438	102	67	196
23	330	255				255	372	2,120	417	102	53	186
24	330	262		200		255	428	2,100	401	102	53	186
25	310	238				255	428	2,030	351	102	53	176
26	310	229				273	458	1,920	327	102	53	176
27	291	222				255	495	1,920	291	90	53	169
28	291	229				273	428	2,060	282	67	74	241
29	291	238			-------	273	443	2,140	262	53	80	262
30	310	229			-------	255	468	1,680	249	56	70	282
31	291	-------			-------	291	-------	1,460	-------	70	70	-------

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Daily discharge, in second-feet, of Duchesne River at Duchesne, Utah, for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919–20												
1	291	211	203				154	262	2,700	935	245	205
2	291	222	203			240	186	282	2,400	890	245	205
3	319	233	203				186	304	2,340	1,070	370	188
4	327	222					169	327	2,340	1,120	290	188
5	291	222				186	186	327	2,400	935	245	205
6	282	203	212			186	241	327	2,580	670	268	205
7	282	211				178	222	375	2,700	630	245	205
8	262	241	210			169	262	375	2,700	630	245	205
9	262	222				162	282	576	2,460	590	268	268
10	249	222				154	282	645	2,820	630	225	245
11	241	222				170	304	610	2,230	630	225	225
12	241	241				186	241	543	2,010	590	188	225
13	241	211				180	241	576	1,960	550	188	205
14	233	211				175	241	690	1,840	510	170	205
15	262	211			200	169	203	680	1,790	400	188	205
16	241	222		170		178	282	680	2,010	435	170	205
17	241	233				186	304	795	2,120	400	170	225
18	241	222				186	282	965	1,900	400	188	205
19	241	233				186	241	1,140	2,060	550	400	205
20	241	222	175			186	203	1,480	2,010	435	268	225
21	233	211				186	186	1,680	2,060	400	225	205
22	222	211				186	186	2,010	2,060	340	225	205
23	222	211				203	203	1,840	2,120	400	205	205
24	222	222				176	203	1,740	1,840	370	205	225
25	222	211				181	222	1,840	1,270	315	205	225
26	222	211				186	186	2,060	1,170	315	225	205
27	222	208				178	169	2,010	1,120	290	205	205
28	222	206				169	186	2,340	1,020	290	205	225
29	222	203				175	186	2,580	980	315	245	245
30	222	203			-------	180	222	2,760	980	225	225	245
31	211	-------			-------	186	-------	2,720	-------	205	205	-------

Monthly discharge of Duchesne River at Duchesne, Utah, for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	468	207	322	19,800
November	310	222	267	15,900
December	310	----------	217	13,300
January	----------	----------	186	11,400
February	----------	----------	200	11,100
March	310	----------	224	13,800
April	495	198	296	17,600
May	2,140	533	1,310	80,600
June	1,300	249	710	42,200
July	241	53	137	8,420
August	282	53	103	6,330
September	282	90	201	12,000
The year	2,140	53	349	252,000
1919–20				
October	327	211	249	15,300
November	241	203	218	13,000
December	----------	----------	184	11,300
January	----------	----------	170	10,500
February	----------	----------	200	11,500
March	----------	154	187	11,500
April	304	154	222	13,200
May	2,760	262	1,150	70,700
June	2,820	980	2,000	119,000
July	1,120	205	531	32,600
August	400	170	231	14,200
September	268	188	215	12,800
The year	2,820	154	462	336,000

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DUCHESNE RIVER AT MYTON, UTAH

LOCATION.—In NW. ¼ sec. 25, T. 3 S., R. 2 W., at highway bridge at Myton, Duchesne County, 3 miles below mouth of Lake Fork and 15 miles above mouth of Uinta River.

DRAINAGE AREA.—2,750 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 26, 1899, to November 30, 1910, and July 26, 1911, to September 30, 1920.

GAGE.—Chain gage on upstream rail near left end of steel highway bridge; installed August 6, 1910; read by Owen Smith. See previous report for description of gages used prior to August 6, 1910.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading about 100 feet below bridge.

CHANNEL AND CONTROL.—Bed composed of coarse gravel; banks comparatively low but not likely to be overflowed, although they are subject to erosion during high water. Current comparatively swift and makes an angle with the bridge at low stages. Principal control probably a gravel bar at the ford 100 or 200 feet below gage; apparently fairly permanent. Gage height of zero flow, 0.40 foot, determined September 22, 1919.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 5 feet at 8.30 p. m. May 21 and 7.30 p. m. May 24 (discharge, 3,560 second-feet); minimum stage recorded, 0.75 foot at 8.30 p. m. August 23 and 8 a. m. August 24 (discharge, 8 second-feet).

Maximum stage recorded during year ending September 30, 1920, 6.1 feet at 8 a. m. June 1 (discharge, 5,690 second-feet). Minimum stage recorded, 1.7 feet on September 15 (discharge, 240 second-feet).

1899–1920: Maximum stage recorded, 7.4 feet, June 20, 22, and 23, 1917 (discharge, 9,690 second-feet). Minimum stage recorded, 0.75 foot at 8.30 p. m. August 23 and 8 a. m. August 24, 1919 (discharge, 8 second-feet).

ICE.—Stage-discharge relation seriously affected by ice every winter.

DIVERSIONS.—Much of the low-water flow of the river and its tributaries is diverted for irrigation above station.

REGULATION.—Annual run-off is affected by storage in the United States Bureau of Reclamation reservoir on Strawberry River, one of the main tributaries.

ACCURACY.—Stage-discharge relation changed May 24, 1919; affected by ice December 27, 1918, to March 15, 1919, November 11, 1919, November 24, 1919, to March 22, 1920, and March 27, 1920. Rating curves well defined. Gage read to half-tenths twice a day. Daily discharge ascertained by applying mean daily gage height to rating table except for periods of ice effect. For these periods discharge was estimated from meter measurements, study of observer's notes, gage heights, weather records, and hydrographic comparison with Duchesne River at Duchesne, Strawberry River at Duchesne, and Lake Fork near Myton. Records good.

Discharge measurements of Duchesne River at Myton, Utah, during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1918		*Feet*	*Sec.-ft.*	1920		*Feet*	*Sec.-ft.*
Nov. 16	Bones and Jordan	1.98	450	Mar. 11	Dickinson and Carmody	[a] 3.35	587
1919				23	do	[a] 2.25	480
Jan. 19	L. W. Jordan	[a] 3.85	262	May 29	Purton and Carmody	5.50	4,510
May 17	do	3.67	1,810	June 9	E. G. Thorum [c]	6.00	5,370
Aug. 26	Carmody and Burdick [b]	.80	11.6				
Sept. 22	Rush and Purton	1.70	241				
Dec. 6	A. B. Purton	[a] 2.20	374				

[a] Stage-discharge relation affected by ice.
[b] Irrigation engineers for U. S. Indian Service.
[c] Engineer for Utah Power & Light Co.

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Daily discharge, in second-feet, of Duchesne River at Myton, Utah, for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	293	606	420				675	1,010	1,750	220	310	34
2	293	508	478				626	1,170	1,530	208	310	108
3	293	508	478				606	1,260	1,310	172	355	362
4	420	508	540				606	1,460	1,100	165	335	296
5	540	508	540				559	1,550	1,100	165	208	262
6	508	508	540				559	1,610	1,080	159	193	285
7	675	508	540				559	1,350	1,220	141	172	262
8	606	508	640			460	521	1,440	1,150	135	159	335
9	710	508	572				521	1,280	1,060	113	159	315
10	785	448	420	240			508	1,260	996	89	515	362
11	675	508	392				478	1,190	1,040	73	200	310
12	508	508	341				448	1,110	963	73	135	249
13	448	508	366				420	1,170	895	62	80	240
14	478	508	317				448	1,240	775	62	62	240
15	448	508	392		350		478	1,530	735	62	62	240
16	448	478	420			640	460	1,650	785	52	62	310
17	572	437	478			750	420	1,930	669	66	62	285
18	1,010	431	540			780	448	1,900	585	310	52	295
19	710	478	540	262		820	508	2,440	550	200	42	310
20	572	448	508			725	572	3,600	420	168	25	276
21	572	442	382			930	606	3,380	482	84	25	262
22	572	392	408			1,010	750	3,350	450	84	22	262
23	508	392	392			1,020	785	3,230	450	165	11	249
24	508	398	331			980	841	3,380	390	165	11	240
25	508	392	317			970	959	2,860	385	42	12	240
26	508	341	270	200		710	1,090	2,410	326	42	12	240
27	478	331				696	1,090	2,730	310	34	52	249
28	478	331				640	1,110	3,180	249	25	66	325
29	508	327	260		-------	696	994	3,290	232	25	46	362
30	508	392			-------	750	870	3,000	200	25	28	450
31	508	-------			-------	654	-------	2,360	-------	22	25	-------
1919–20												
1	450	379					420	390	5,570	1,420	1,340	390
2	450	335					450	515	4,500	1,340	571	310
3	460	335	350				482	529	3,860	1,240	450	295
4	438	310					390	660	3,640	1,150	622	285
5	402	310					390	735	3,720	1,100	550	285
6	390	335	374			550	450	735	4,310	1,020	482	335
7	335	335					482	799	4,900	912	482	390
8	346	390					515	815	5,340	815	515	420
9	379	390					482	1,060	5,570	735	515	390
10	390	390					450	1,280	5,000	585	515	390
11	390	515	320			587	450	1,380	3,880	622	450	335
12	362	420					450	1,380	3,260	550	420	335
13	335	390					450	1,380	3,410	550	420	325
14	379	550					482	1,530	3,260	550	362	262
15	390	550			375		502	1,430	3,260	482	335	240
16	379	390		290			550	1,430	3,110	515	335	276
17	362	379				550	515	1,680	3,110	622	335	285
18	262	379					622	1,909	2,830	515	285	285
19	335	390					585	2,010	2,640	515	912	390
20	335	390					420	2,310	2,440	482	775	346
21	335	390					390	2,970	2,310	462	720	335
22	335	390					390	3,380	2,640	390	550	310
23	335	362				480	390	3,640	2,570	450	450	285
24	335		275			470	390	3,690	2,380	450	450	285
25	450					450	550	3,590	2,170	450	468	285
26	335	340				450	390	4,020	2,010	450	468	325
27	335					470	390	4,020	1,860	450	735	335
28	325					463	550	4,170	1,820	390	698	335
29	325					450	390	4,440	1,630	335	585	310
30	362				-------	402	390	5,220	1,630	335	550	285
31	390	-------			-------	390	-------	5,500	-------	335	550	-------

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Monthly discharge of Duchesne River at Myton, Utah, for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	1,010	293	537	33,000
November	606	327	456	27,100
December	640		415	25,500
January			251	15,400
February			350	19,400
March	1,030		632	38,900
April	1,110	420	650	38,700
May	3,380	1,010	2,060	127,000
June	1,750	200	770	45,800
July	310	25	169	6,700
August	855	11	139	8,550
September	815	34	292	17,400
The year	3,380	11	556	403,000
1919-20				
October	450	325	372	22,900
November	550		379	22,600
December			303	18,600
January			290	17,800
February			375	21,600
March			522	32,100
April	622	390	456	27,100
May	5,500	390	2,210	136,000
June	5,570	1,630	3,290	196,000
July	1,430	325	653	40,200
August	1,340	285	545	33,500
September	420	240	322	19,200
The year	5,570	240	809	588,000

STRAWBERRY RIVER AT DUCHESNE, UTAH

LOCATION.—In sec. 2, T. 4 S., R. 5 W., at Winslow's ranch, 1 mile west of post office at Duchesne, Duchesne County, half a mile above mouth of Indian Canyon, a small tributary entering from south, and 1½ miles above confluence of Strawberry River with Duchesne River.

DRAINAGE AREA.—1,040 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 10, 1908, to November 30, 1910, and March 16, 1914, to September 30, 1920.

GAGE.—Vertical staff installed July 30, 1918, on downstream side of right abutment of bridge; read by E. S. Winslow. Inclined staff on right bank, about 30 feet below present bridge used April 12, 1914, to July 29, 1918. Gage datum lowered 1 foot November 5, 1915, and 1 foot July 30, 1918. Chain gage at approximately same site, but different datum used 1908–1910. A staff gage at the county bridge about 1 mile below was used from March 16 to April 11, 1914.

DISCHARGE MEASUREMENTS.—Made from cable just below bridge or by wading.

CHANNEL AND CONTROL.—Banks comparatively low; covered with underbrush; left bank subject to overflow at very high stages. Principal control is gravel bar; apparently fairly permanent. Gage height of zero flow, 0.5 foot, determined September 21, 1919.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 4.05 feet at 7 p. m. May 4 (discharge, 760 second-feet); minimum stage recorded, 1.60 feet a number of times during the last week in August (discharge, 36 second-feet).

Maximum stage recorded during year ending September 30, 1920, 6.0 feet at 7 p. m. May 23 and 7 a. m. May 24 (discharge, 1,470 second-feet). Minimum discharge not determined; probably less than 50 second-feet in the winter.

1908–1920: Maximum discharge recorded, 1,860 second-feet, April 22, 1910; minimum discharge, 30 second-feet, November 20, 1914. Records obtained prior to 1914 incomplete.

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ICE.—Stage-discharge relation affected by ice every winter.

DIVERSIONS.—Water stored in Strawberry Valley reservoir (capacity, 250,000 acre-feet) about 40 miles above station, is diverted by means of a tunnel to the Spanish Fork drainage basin. Some water is also diverted from the upper end of Strawberry Valley to the basin of Provo River.

REGULATION.—Since 1912 flow of river has been affected by operation of Strawberry Valley reservoir.

ACCURACY.—Stage-discharge relation changed during winter of 1919–20, and again about May 25, 1920; affected by ice November 27, 1918, to March 26, 1919, and November 28, 1919, to March 17, 1920. Rating curves used October 1, 1918, to November 27, 1919, well defined. Curves for remainder of 1920 fairly well defined. Gage read to half-tenths twice a day. Daily discharge ascertained by applying mean daily gage height to rating table except for periods when stage-discharge relation was affected by ice. For these periods, discharge was estimated from meter measurements, study of weather records, observer's notes, and hydrographic comparison with Duchesne River at Duchesne and at Myton, and Lake Fork near Myton Shifting control method used May 24–26, 1920. Records good.

Discharge measurements of Strawberry River at Duchesne, Utah, during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1918		*Feet*	*Sec.-ft.*	1920		*Feet*	*Sec.-ft.*
Oct. 31	Bones and Jordan	1.99	90	Mar. 5	W. E. Dickinson	*3.52	79
1919				24	do	2.10	94
Jan. 18	L. W. Jordan	*3.48	50	May 30	A. B. Purton	5.36	1,180
May 17	do	3.42	495				
Sept. 21	Rush and Purton	1.91	70				
Dec. 8	A. B. Purton	*2.40	66				

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Strawberry River at Duchesne, Utah, for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	65	88					143	518	317	97	248	80
2	73	88					147	559	304	97	130	207
3	85	88					136	618	264	88	326	220
4	106	88					143	705	278	88	130	97
5	106	88					126	696	254	88	110	92
6	102	86					143	705	248	88	97	88
7	99	80					147	618	242	80	97	143
8	102	80	60			90	189	518	226	74	88	350
9	114	80		35			143	518	220	71	248	116
10	165	80					130	567	207	71	175	92
11	114	88					122	559	194	68	122	88
12	102	80					136	518	194	60	110	85
13	99	80					147	506	182	60	92	71
14	95	80			70		136	526	175	57	80	182
15	90	80					143	506	158	68	74	88
16	85	80					136	495	147	64	71	64
17	288	80					136	495	147	248	64	64
18	172	88		50			147	495	143	215	60	68
19	143	88					165	487	130	88	60	80
20	128	88					207	487	126	80	64	80
21	114	88				180	248	480	126	80	52	74
22	102	88					370	457	126	74	52	71
23	95	89	40				350	430	116	74	38	68
24	85	68					370	412	110	80	38	64
25	81	64		60			377	405	106	68	38	71
26	73	60					350	384	106	64	136	71
27	73					158	412	360	106	57	55	71
28	78					126	405	343	106	52	44	122
29	81	55			-------	106	360	336	102	52	41	130
30	78				-------	136	420	336	97	52	38	106
31	95	-------			-------	182	-------	319	-------	60	36	-------

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Daily discharge, in second-feet, of Strawberry River at Duchesne, Utah, for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919–20												
1	122	85					86	264	1,120	314	155	129
2	122	97					77	304	1,080	282	155	125
3	122	97				90	80	327	980	267	400	119
4	122	92	75				77	396	927	267	374	109
5	92	85				79	86	407	842	252	276	133
6	88	80					137	418	802	252	219	129
7	88	80					199	470	790	238	219	119
8	88	97	66				174	508	770	294	282	119
9	88	88					174	640	738	224	388	193
10	85	74					192	896	698	203	276	150
11	80	92					199	913	658	198	193	133
12	80	88				100	151	812	618	193	168	119
13	80	88					129	772	578	186	155	109
14	85	80					109	860	570	186	150	100
15	92	80			80		151	860	550	186	150	100
16	88	85		75			192	828	522	198	150	100
17	88	97					209	882	498	178	140	246
18	88	74				77	174	998	460	178	340	434
19	88	74				77	133	1,120	445	186	1,000	109
20	88	74	60			133	133	1,260	423	173	682	100
21	88	74				167	151	1,410	409	168	330	91
22	88	88				179	144	1,490	381	162	178	91
23	88	92				144	151	1,550	364	168	150	91
24	88	88				94	144	1,500	347	155	129	100
25	88	85				77	144	1,420	340	155	133	160
26	88	85				77	133	1,420	321	150	186	100
27	88	80				86	137	1,250	354	162	186	100
28	88					86	151	1,220	340	155	140	100
29	88	72				77	174	1,190	330	168	129	100
30	88				-------	77	199	1,160	314	150	129	100
31	88	-------			-------	77	-------	1,160	-------	146	129	-------

Monthly discharge of Strawberry River at Duchesne, Utah, for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	223	65	104	6,400
November	88	----------	78.5	4,670
December	----------	----------	49.7	3,060
January	----------	----------	46.0	2,830
February	----------	----------	70.0	3,890
March	----------	----------	130	7,990
April	420	122	219	13,000
May	705	310	495	30,400
June	317	97	176	10,500
July	248	52	82.7	5,080
August	326	36	97.2	5,980
September	350	64	107	6,370
The year	705	----------	138	100,000
1919–20				
October	122	80	91.7	5,640
November	97	----------	83.8	4,990
December	----------	----------	63.6	3,910
January	----------	----------	75.0	4,610
February	----------	----------	80.0	4,600
March	179	77	98.9	6,080
April	209	77	146	8,690
May	1,550	264	926	56,900
June	1,120	314	584	34,800
July	314	146	198	12,200
August	1,000	129	248	15,200
September	434	91	128	7,620
The year	1,550	----------	228	165,000

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RED CREEK NEAR FRUITLAND, UTAH

LOCATION.—In sec. 28, T. 3 S., R. 8 W., Uinta special base and meridian, 400 feet above State highway crossing at D. S. Murdock's ranch and 4 miles southeast of Fruitland, Duchesne County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 23, 1917, to September 30, 1920.

GAGE.—Vertical enamel staff on left bank 200 feet east of ranch house and 400 feet upstream from road bridge; read by Mrs. A. S. Murdock.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—One channel at all stages. Banks subject to overflow at extreme high water. Left bank overgrown with willows. Right bank sloping meadow. Stream bed composed of silt and sand; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage during the year ending September 30, 1919, 8.95 feet on July 31, determined by levels to high-water mark (discharge, probably greater than 400 second-feet). Creek dry June 25 to July 12.

Maximum stage during year ending September 30, 1920, water over top of gage (6.6 feet) during sudden flood on August 4; discharge not determined. Minimum stage recorded, 3.48 feet March 22 (discharge, 0.6 second-foot).

1918–1920: Maximum and minimum stages same as for 1919.

ICE.—Stream freezes over every winter.

DIVERSIONS.—Below all diversions from Red Creek.

REGULATION.—None except by diversion.

ACCURACY.—Stage-discharge relation changed by flood July 31 to August 3, 1919; affected by ice November 16, 1918, to March 24, 1919, and November 24, 1919, to March 13, 1920. Rating curve used until July 31, 1919, fairly well defined; curve used for remainder of period well defined. Gage read once a day to hundredths except June 17–24, July 13–28, 1919, when water was below gage; and July 31 to August 3, 1919, May 17–22, and August 4, 1920, when water was over top of gage. Daily discharge ascertained by applying daily gage height to rating table. Discharge for periods when water was over or below gage estimated from elevation of high-water marks, and observer's notes. Creek dry June 25 to July 12, 1919. Records good.

Discharge measurements of Red Creek near Fruitland, Utah, during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
1918				1919			
Nov. 17	Jordan and Bones	[a] 4.22	5.5	Dec. 7	A. B. Purton	[a] 4.38	8.3
1919				1920			
Jan. 17	L. W. Jordan	[a] 5.30	7.2	Mar. 7	W. E. Dickinson	[a] 3.91	5.7
May 18	do	4.93	45.8	May 23	A. B. Purton	6.01	120
Sept. 20	Rush and Purton	3.90	6.1				

[a] Stage-discharge relation affected by ice.

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Daily discharge, in second-feet, of Red Creek near Fruitland, Utah, for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	8	10					26	46	16			7
2	8	10					21	59	15		200	7
3	10	10					20	66	12			6
4	8	10					20	72	10		8	7
5	9	10					20	72	10		8	7
6	10	9					16	66	9		7	7
7	8	9					15	61	8	0	6	7
8	9	10				1	15	58	5		8	6
9	29	15		6			14	55	3		5	6
10	9	20					14	50	2		6	6
11	9	25			6		14	51	1		7	6
12	9	23					14	48	1		7	6
13	8	25					14	43	1		6	6
14	8	10					21	43	1		6	6
15	8	10					24	43	1		6	6
16	9	8	8				25	42	1		6	6
17	56	6		7			25	43			6	6
18	9					5	27	47			6	6
19	9						25	48			6	6
20	9						24	41			6	6
21	9						47	38	.5	.5	6	6
22	9					45	41	30			6	6
23	9						39	29			6	6
24	8	5					39	29			5	6
25	8			7		33	43	27			5	6
26	9				4	28	42	24			3	6
27	9					28	43	22	0		3	6
28	9					29	42	20			4	14
29	9				-------	28	43	21		3	3	11
30	8				-------	29	43	19		19	4	8
31	9	-------			-------	29	-------	18	-------	250	4	-------
1919–20												
1	6	14					13	19	61	4	4	5
2	6	11					12	19	61	2	20	5
3	6	8	9				13	19	61	2	43	5
4	6	8					8	19	55	2	200	5
5	6	8					11	19	55	2	10	6
6	6	8	8				15	19	38	2	6	6
7	6	8				6	14	19	32	2	6	7
8	6	8		6			14	36	32	2	6	7
9	6	14					14	42	28	1	5	20
10	6	14					13	68	22	1	5	11
11	6	14					13	67	17	3	5	10
12	6	15					11	65	16	3	3	8
13	6	14					11	61	16	2	3	7
14	6	14				3	12	60	14	2	3	7
15	6	14			5	3	9	60	14	2	6	7
16	6	14				2	11	58	13	3	7	6
17	7	14				2	18		13	3	8	6
18	7	14				2	11		10	3	11	7
19	7	14	6			1	11		10	3	8	5
20	7	14				1	11	100	8	3	11	6
21	7	14				1	12		7	3	7	6
22	6	14				1	8		7	3	6	8
23	7	14		10		2	7	120	7	3	5	8
24	8					3	7	108	6	3	5	8
25	8					4	9	117	4	3	8	8
26	8	11				6	9	96	4	3	6	8
27	8					10	11	96	4	3	7	8
28	6					12	11	89	8	4	6	8
29	14					13	11	89	6	3	6	8
30	14				-------	7	14	89	10	3	6	8
31	14	-------			-------	7	-------	89	-------	3	5	-------

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Monthly discharge of Red Creek near Fruitland, Utah, for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	56	8	10.9	670
November	25		9.50	565
December			8.00	492
January			6.48	398
February			5.57	309
March			13.4	824
April	47	14	27.2	1,620
May	72	18	42.9	2,640
June	16	0	3.33	198
July	250	0	9.03	555
August		3	24.5	1,510
September	14	6	6.70	399
The year	250	0	14.1	10,200
1919–20				
October	14	6	7.23	445
November	15	8	12.0	714
December			6.55	403
January			8.06	496
February			5.00	288
March	13	1	5.10	314
April	15	7	11.3	672
May	120	19	69.0	4,240
June	61	4	21.3	1,270
July	4	1	2.61	160
August	200	3	14.1	867
September	20	5	7.47	444
The year	200	1	14.2	10,300

ANTELOPE CREEK NEAR MYTON, UTAH

LOCATION.—In NW. ¼ sec. 10, T. 4 S., R. 3 W., at crossing of Gray Mountain canal over creek, a quarter of a mile above mouth and 10 miles west of Myton, Duchesne County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 1, 1917, to September 30, 1920.

GAGE.—Vertical staff on right bank fastened to column of flume of Gray Mountain canal; read by Anthon Tucker.

DISCHARGE MEASUREMENTS.—Made by wading. High water can be measured from wagon bridge 25 feet above gage.

CHANNEL AND CONTROL.—Channel is composed of hard clay, and is straight for a few hundred feet above and below gage. Banks high and not subject to overflow. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum discharge not determined. Creek dry a large part of each year.

ICE.—Considerable ice during winter.

DIVERSIONS.—Station is below all diversions.

REGULATION.—None except that caused by numerous small diversions above.

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ACCURACY.—Stage-discharge relation permanent except December 20, 1918, to January 6, 1919, when a temporary dam was in place which caused about 2 feet of backwater at the gage. During this period an ice cover in excess of a foot thick was formed. When the dam was removed on January 6, 1919, the ice cover remained in position, protecting the stream from further freezing and allowing it to flow unobstructed during the remainder of the winter. Stage-discharge relation affected by ice November 26, 1919, to March 26, 1920. Rating curve well defined below 15 second-feet. No measurements of discharge have yet been made at higher stages. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Discharge December 20, 1918, to January 6, 1919, interpolated. Discharge estimated because of ice, November 26, 1919, to March 26, 1920. Records fair.

Discharge measurements of Antelope Creek near Myton, Utah, during the years ending Sept. 30, 1919 and 1920

Date	Made by	Gage height	Discharge	Date	Made by	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
1918 Nov. 16	Bones and Jordan	7.10	3.2	1919 Dec. 6	A. B. Purton	* 8.75	1.4
1919 Jan. 19	L. W. Jordan	6.90	1.9	1920 Mar. 10	W. E. Dickinson	6.88	1.7
May 17	do	6.60	.2				

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Antelope Creek near Myton, Utah; for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Aug.	Sept.
1918-19											
1	0.4	4.2	3.5		1.7	1.7	3.0		0.2		
2	.4	4.2	3.5		1.7	1.7	3.0		.2		
3	.4	4.2	3.5		1.7	1.7	2.5		.2		
4	.4	3.5	3.5	3	1.7	1.7	2.5		.2		
5	.2	3.5	3.5		1.7	1.7	1.0		.2		
6	.2	4.2	3.3		1.7	1.7			.2		
7	.2	4.2	3.3	2.5	1.7	1.7			.2		
8	.2	4.2	3.3	2.5	1.7	1.7			.2		
9	.2	4.2	3.3	2.5	1.7	1.7			.2		
10	.2	3.5	3.3	2.5	1.7	1.7			.2		
11	.2	3.5	3.3	2.5	1.7	2.1			.2		
12	.2	3.5	3.3	2.5	1.7	2.1			.2		
13	.2	3.5	3.3	2.5	1.7	2.1			.2		
14	.2	3.5	3.3	2.1	1.7	2.1			.2		
15	.2	3.5	3.3	2.1	1.7	2.1			.2		
16	.2	3.5	3.3	1.7	1.7	2.5			.2		
17	.2	3.5	3.3	1.7	1.7	2.5		0.2	.2		
18	.2	3.5	3.3	1.7	1.7	3.0		.2	.2		
19	.2	3.5	3.3	1.7	1.7	3.0		.2	.2		
20	2	3.5		1.7	1.7	3.0		.2	.2		
21	.2	3.5		1.7	1.7	3.0		.2	.2		
22	.2	3.5		1.7	1.7	3.0		.2	.2		
23	.2	3.5		1.7	1.7	3.0		.2	.2		
24	.2	3.5		1.7	1.7	3.0		.2	.2		
25	.2	3.5	3	1.7	1.7	3.5		.2	.2		
26	3.5	3.5		1.7	1.7	3.5		.2	.2		
27	3.5	3.5		1.7	1.7	3.5		.2	.2		
28	3.5	3.5		1.7	1.7	3.5		.2	.2		
29	3.5	3.5		1.7		3.5		.2	.2		
30	4.2	3.5		1.7		3.5		.2	.2		
31	4.2			1.7		3.5		.2			

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Daily discharge, in second-feet, of Antelope Creek near Myton, Utah, for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Aug.	Sept.
1919–20											
1							1.0				8.0
2											7.1
3		0.7					.5				7.1
4		2.1									8.0
5		2.1				1.5					6.2
6		2.1									6.2
7		2.1					1.0				2.5
8		2.1									2.5
9		2.1									1.7
10		2.1				1.7					1.7
11		2.3									1.7
12		2.3									6.2
13		2.3									4.8
14		2.3									4.8
15		2.3			1.5	1.7					6.2
16		2.3	1.5	1.5							6.2
17		2.3									2.5
18		2.3									2.5
19		2.3									1.7
20		2.3				1.7				4.0	1.7
21		2.3									1.7
22		2.3								6.2	1.0
23		2.3								6.2	1.0
24		2.3				1.7				8.0	1.0
25		2.3								8.0	1.0
26										8.0	1.7
27						1.7				10.0	1.0
28		2.0				1.7				8.0	1.0
29										6.2	1.0
30										8.0	1.0
31						1.0				8.0	

NOTE.—Braced figures show mean discharge for period indicated, when stage-discharge relation was affected by ice or backwater. Discharge Oct. 27, 1918, to Nov. 3, 1918, estimated, assumed gage read 1 foot too low by observer. Stream dry on days for which no discharge is given.

Monthly discharge of Antelope Creek near Myton, Utah, for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	4.2	0.2	0.91	56
November	4.2	3.5	3.67	218
December	3.5		3.22	198
January		1.7	2.16	133
February	1.7	1.7	1.70	94
March	3.5	1.7	2.52	155
April	3.0	0	.40	24
May	.2	0	.10	6
June	.2	.2	.20	12
The year	4.2	0	1.24	896
1919–20				
November	2.3	0	2.00	119
December			1.5	92
January			1.5	92
February			1.5	86
March		0	1.51	93
April	1.0	0	.083	5
August	10	0	2.86	176
September	8	1.0	3.36	200
The year	10	0	1.19	865

NOTE.—Stream dry during months for which no discharge is given.

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LAKE FORK NEAR ALTONAH, UTAH

LOCATION.—In S. ½ sec. 32, T. 1 N., R. 4 W., a quarter of a mile below heading of United States Lake Fork canal, and 4½ miles northwest from Altonah, Duchesne County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 15, 1917, to July 30, 1920, when record was discontinued. June 4 to September 18, 1917, station maintained three-eighths mile upstream; records not directly comparable as United States Lake Fork canal diverts water between stations.

GAGE.—Stevens continuous water-stage recorder on right bank; installed October 15, 1917; inspected by W. R. Preece. Also inside and outside vertical staff gages.

DISCHARGE MEASUREMENTS.—Made from cable near gage or by wading.

CHANNEL AND CONTROL.—Channel irregular. Stream bed very rough; composed of boulders and gravel. Low-water channel shifting. No marked control.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 3.39 feet at 3 a. m. May 21 (discharge, 1,230 second-feet). Minimum stage from water-stage recorder, 0.61 foot from 3 to 10 a. m. September 27 (discharge, 6 second-feet).

Maximum stage during period October 1, 1919, to July 31, 1920, from water-stage recorder, 4.45 feet at 4 p. m. July 31 (discharge about 2,300 second-feet). Minimum discharge about 1 second-foot October 12–20. On July 31, 1920, Moon Lake reservoir dam broke. Flood flow past station not determined.

1918–1920: Maximum and minimum is that of 1920.

ICE.—Stream freezes over each winter.

DIVERSIONS.—Above all diversions except Farnsworth canal, Payne canal, and United States Lake Fork canal. Records of these canals for the irrigation season accompany records for this station.

REGULATION.—A number of small lakes on the headwaters have been developed for storage.

ACCURACY.—Stage-discharge relation changed somewhat about October 12, 1918, assumed permanent thereafter; affected by ice each winter. Rating curve fairly well defined. Operation of water-stage recorder satisfactory except for winter periods and a few short periods at other times. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Discharge for winter of 1918–19 and October 12–20, 1919, estimated by comparison with flow at station on Lake Fork near Myton. Discharge interpolated July 10, August 6, 20–21, 1919, and July 7, 21–25, 1920. Discharge not determined for winter of 1919–20 nor after July 30, 1920. Records fair.

Records of discharge of Farnsworth canal, Payne canal, and United States Lake Fork canal for the irrigation seasons are published herewith to supplement the records of flow at this station as these are the only diversions in the Lake Fork basin above this station. The records of daily discharge of these canals were furnished by C. C. Jacob, Federal court water commissioner.

97418—25†—WSP 509——11

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Discharge measurements of Lake Fork near Altonah, Utah, during the period Oct. 1, 1918, to Nov. 3, 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
1918				1919			
Nov. 2	Jordan and Bones	1.32	125	Dec. 5	A. B. Purton	* 1.40	72
1919				1920			
Jan. 20	L. W. Jordan	* 1.80	75	Mar. 14	W. E. Dickinson	1.16	70
Apr. 24	C. C. Jacob	1.40	168	May 24	Purton and Jacob	2.38	590
May 8	L. W. Jordan	1.63	234	Nov. 3	A. B. Purton	1.22	103
Sept. 22	Purton and Rush	1.17	72				

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Lake Fork near Altonah, Utah, for the period Oct. 1, 1918, to July 30, 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	120	124	89				68	165	425	185	128	83
2	122	117	89					189	350	185	283	98
3	127	120	86					245	337	185	253	104
4	162	131	86					288	314	120	181	117
5	183	124				55		346	328	114	145	110
6	237	124					55	310	391	124	132	114
7	259	120						270	450	120	120	153
8	225	124						257	378	114	120	205
9	220	117				55		253	286	104	153	124
10	222	114						237	328	104	149	119
11	198	104	85	80			45	193	391	104	120	98
12	145	104					47	153	378	110	101	92
13	135	101					49	225	378	110	80	86
14	124	104					51	165	355	110	65	83
15	120	114			60			440	346	98	62	86
16	131	117						565	355	117	45	86
17	197	110	80					580	337	117	41	86
18	209	120	86					655	288	120	47	83
19	185	114	86				109	843	278	104	65	89
20	165	104	89	75		60		995	268	92	69	80
21	157	104	89					1,100	301	86	74	75
22	135	95						1,030	292	80	78	72
23	128	95					145	1,030	274	72	75	70
24	114	95					128	1,030	253	70	75	65
25	104	* 95	90				142	800	233	70	75	49
26	89	92		70			181	830	217	68	72	14
27	95	92					161	920	201	68	98	12
28	95	89	92				120	1,020	193	65	86	110
29	124	89			-------		95	967	193	70	80	98
30	138	89	90		-------		128	818	185	75	78	86
31	131	-------			-------	68	-------	600	-------	78	75	-------

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Daily discharge, in second-feet, of Lake Fork near Altonah, Utah, for the period Oct. 1, 1918, to July 30, 1920—Continued

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919-20												
1	80							80	1,160	420		
2	83							92	1,140	382		
3	86							98	940	378		
4	80							70	930	373		
5	72		72					70	1,000	319		
6	68							80	1,140	138		
7	65							70	1,240	190		
8	62							86	1,400	241		
9	58						101	104	1,430	332		
10	7						95	131	1,170	301		
11	2	35					83	245	806	288		
12							83	169	776	296		
13							95	177	818	288		
14						70	98	283	782	253		
15		80					92	283	764	245		
16	1						92	278	776	310		
17		89					80	301	616	337		
18							75	268	560	296		
19							72	378	628	278		
20		80				68	78	425	600	253		
21	2						72	525	622			
22	35	92					70	630	682			
23	51						65	622	650[a]	260		
24	12						62	611	580			
25	14						43	688	545			
26	6	83					41	764	520	270		
27							45	836	525	233		
28							55	960	530	213		
29						65	72	1,140	480	205		
30							68	1,340	455	193		
31								1,300				

Monthly discharge of Lake Fork near Altonah, Utah, for the period Oct. 1, 1918, to July 30, 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	259	89	155	9,530
November	131	89	108	6,430
December			87.2	5,360
January			76.3	4,690
February			60.0	3,330
March			58.8	3,620
April	181		88.5	5,270
May	1,100	153	565	34,700
June	450	185	314	18,700
July	185	65	104	6,409
August	283	41	104	6,400
September	205	12	91.6	5,450
The year	1,100	12	152	110,000
1919-20				
October 1-26	86		30.5	1,570
April 9-30	101	41	74.4	3,250
May	1,340	70	426	26,200
June	1,430	455	809	48,100
July 1-30	420	138	278	16,500

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Daily discharge, in second-feet, of Farnsworth canal near Altonah, Utah, for the irrigation seasons, 1919 and 1920

Day	May	June	July	Aug.	Sept.	Day	May	June	July	Aug.	Sept.
1919						1920					
1	-------	82	7	2	5	1	40	115	115	-------	10
2	-------	61	8	3	6	2	40	115	127	-------	10
3	-------	36	54	2	6	3	40	115	137	-------	10
4	-------	35	68	2	6	4	40	115	122	80	10
5	-------	35	47	5	7	5	40	115	137	80	10
6	-------	56	50	7	7	6	16	115	134	80	10
7	-------	69	55	9	7	7	16	115	134	80	10
8	-------	77	55	9	6	8	15	115	22	80	10
9	-------	89	55	9	15	9	12	115	22	80	10
10	-------	92	55	9	16	10	12	115	22	80	10
11	-------	96	54	10	16	11	-------	115	22	80	10
12	-------	37	55	10	16	12	-------	115	10	80	10
13	56	37	55	10	15	13	-------	115	10	80	10
14	60	37	80	10	14	14	-------	115	10	57	10
15	64	32	10	27	14	15	-------	115	10	11	10
16	69	29	9	24	-------	16	-------	115	10	11	-------
17	76	40	10	22	-------	17	-------	115	10	11	-------
18	81	32	11	6	-------	18	-------	115	10	11	-------
19	80	20	11	7	-------	19	-------	115	10	11	-------
20	82	12	10	8	-------	20	-------	115	87	11	-------
21	82	11	10	8	-------	21	-------	115	87	11	-------
22	82	11	10	8	-------	22	-------	115	87	10	-------
23	82	11	12	8	-------	23	-------	115	87	10	-------
24	82	11	15	8	-------	24	-------	115	87	10	-------
25	82	10	17	6	-------	25	-------	115	87	10	-------
26	82	10	14	6	-------	26	-------	115	87	10	-------
27	82	10	35	5	-------	27	-------	115	87	10	-------
28	82	9	35	5	-------	28	-------	115	87	10	-------
29	82	8	35	5	-------	29	-------	115	87	10	-------
30	82	7	22	6	-------	30	-------	115	87	10	-------
31	82	-------	9	6	-------	31	-------	-------	40	10	-------

Monthly discharge of Farnsworth canal near Altonah, Utah, for the irrigation seasons, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
May 13–31	82	56	77.4	2,910
June	96	7	36.7	2,180
July	68	7	29.8	1,830
August	27	2	8.45	523
September 1–15	16	5	10.4	309
The period				7,780
1920				
May	40	0	*21.0	1,290
June	115	115	115	6,840
July	137	10	66.8	4,110
August	80	0	33.4	2,050
September 1–15	10	10	10.0	298
The period				14,600

* Estimated.

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Daily discharge, in second-feet, of Payne canal near Altonah, Utah, for the irrigation seasons, 1919 and 1920

Day	May	June	July	Aug.	Sept.	Day	May	June	July	Aug.	Sept.
1919						1920					
1		50	23	11	11	1		75	32	50	32
2		49	22	11	11	2		71		53	32
3		60	20	11	11	3		67		47	32
4		53	18	23	11	4				35	32
5		63	16	23	11	5		71		30	32
6		41	14	11	11	6			71	25	32
7		53	12	11	11	7		20			32
8		56	12	11	11	8			50		32
9	41	66	12	11	11	9		96	44	29	32
10	45	63	12	11	11	10			29	27	32
11	49	43	12	11	11	11		60		26	32
12	53	41	12	11	11	12				26	32
13	56	41	12	11	11	13		64			32
14	60	43	12	11	11	14					32
15	60	41	12	11	11	15		56			32
16	60	41	14	11		16	38			26	
17	60	41	13	11		17		60			
18	60	30	13	11		18	53		29		
19	60	30	12	12		19	38	67			
20	61	23	12	11		20					
21	61	23	11	11		21	47			23	
22	62	23	11	12		22	80	67			
23	62	23	11	12		23					
24	63	26	11	12		24		67			
25	63	26	11	12		25					
26	63	23	11	12		26		67			
27	70	23	11	11		27	14				
28	73	26	11	11		28	17				
29	80	23	11	11		29	26				
30	67	23	11	11		30	107	67		33	
31	53		11	11		31	97				

Monthly discharge of Payne canal near Altonah, Utah, for the irrigation seasons, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
May 9-31	80	41	60.1	2,780
June	66	23	38.6	2,300
July	23	11	13.1	805
August	23	11	12.0	738
September 1-15	11	11	11.0	327
The period				6,910
1920				
May 16-31			52	1,650
June			63	3,750
July			35	2,150
August			33	2,030
September 1-15			32	952
The period				10,500

NOTE.—Monthly means estimated for May, June, July, August, and September, 1920.

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Daily discharge, in second-feet, of United States Lake Fork canal near Altonah, Utah, for the irrigation seasons, 1919 and 1920

Day	Apr.	May	June	July	Aug.	Sept.	Day	May	June	July	Aug.	Sept.
1919							1920					
1	------	80	145	96	62	52	1	29	124	------	138	51
2	------	81	140	96	61	60	2	39	131	------	140	51
3	------	82	134	96	69	56	3	43	------	155	161	51
4	------	82	130	94	67	58	4	42	------	152	158	51
5	14	81	132	98	62	59	5	20	------	146	67	50
6	16	80	126	94	56	60	6	20	------	131	62	50
7	18	79	125	90	53	72	7	16	192	132	58	50
8	20	88	116	84	50	78	8	31	200	121	58	50
9	22	98	117	80	61	69	9	42	194	115	58	50
10	24	106	113	71	60	58	10	52	185	115	58	50
11	24	100	110	72	52	52	11	52	167	114	58	50
12	24	91	103	73	46	49	12	52	185	113	58	51
13	24	91	98	72	41	47	13	58	207	111	58	50
14	24	100	100	68	36	46	14	67	203	111	58	51
15	25	148	102	65	31	46	16	67	203	111	58	50
16	27	144	102	73	26	------	16	67	203	89	58	------
17	29	149	102	72	24	------	17	69	191	89	58	------
18	30	154	99	76	26	------	18	79	182	89	58	------
19	30	158	95	62	36	------	19	89	80	89	57	------
20	30	162	95	55	34	------	20	89	176	89	56	------
21	32	170	95	50	33	------	21	99	173	89	54	------
22	32	176	95	49	33	------	22	104	172	89	52	------
23	32	184	94	48	31	------	23	104	------	87	52	------
24	32	184	94	47	32	------	24	106	------	82	52	------
25	32	178	99	46	35	------	25	109	------	82	52	------
26	33	176	99	44	42	------	26	116	------	82	52	------
27	34	170	99	43	52	------	27	116	------	78	52	------
28	62	164	98	43	50	------	28	122	------	74	52	------
29	61	158	96	50	48	------	29	129	170	71	52	------
30	60	153	96	51	45	------	30	133	------	77	52	------
31	------	148	------	55	98	------	31	134	------	135	51	------

Monthly discharge of United States Lake Fork canal near Altonah, Utah, for the irrigation seasons, 1919 and 1920

Month	Discharge in second-feet			Run-of in acre-feet
	Maximum	Minimum	Mean	
1919				
April 5–30	62	14	30.4	1,560
May	184	79	130	7,990
June	145	94	108	6,420
July	96	43	68.0	4,180
August	98	24	46.7	2,870
September 1–15	78	46	57.5	1,700
The period	------	------	------	24,700
1920				
May	134	16	74.0	4,550
June	------	------	175	10,400
July	------	------	108	6,640
August	161	51	68.0	4,180
September 1–15	51	50	50.4	1,500
The period	------	------	------	27,300

NOTE.—Mean for June and July, 1920, estimated.

LAKE FORK NEAR MYTON, UTAH

LOCATION.—In sec. 21, T. 3 S., R. 2 W., Uinta special base and meridian, 100 yards below highway bridge, half a mile above confluence of Lake Fork with Duchesne River, and 3½ miles northwest of Myton, Duchesne County. From 1900 to 1903 this station was known as Lake Creek at mouth.

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DRAINAGE AREA.—468 square miles (measured on topographic maps).

RECORDS AVAILABLE.—July 3, 1900, to December 31, 1903; June 13, 1907, to November 30, 1910; July 26, 1911, to September 30, 1920.

GAGE.—Stevens eight-day water-stage recorder on right bank; installed May 7, 1919; inspected by Eddie Verholz. Also inside float and outside inclined staff gages. Present outside gage was installed November 15, 1918, and was read from then until recorder was installed. Former inclined staff gage on left bank directly opposite was read from September 13, 1912, to November 14, 1918. Description of gages used prior to 1912 given in Water-Supply Paper 459.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Banks perpendicular and comparatively high. Stream bed of silt and gravel; somewhat shifting. Control fairly permanent. Gage height of zero flow at 1.3 feet, determined November 15, 1918.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, from water-stage recorder, 4.75 feet at noon May 21 (discharge, 1,080 second-feet). Minimum stage, from recorder, 1.07 feet at 2 a. m. July 6 (discharge, 8 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 6.50 feet at 4 a. m. August 1 (flood from Moon Lake dam failure) (discharge, 2,200 second-feet). Minimum stage, from water-stage recorder, 1.18 feet at noon July 12 (discharge, 12 second-feet).

1900–1903, 1907–1920: Maximum stage recorded, 9.4 feet, June 22 and 23, 1917 (discharge, 4,350 second-feet). Minimum discharge July 24, 1916, probably zero.

ICE.—Stage-discharge relation seriously affected by ice every winter.

DIVERSIONS.—No diversions below station; several canals of the United States Indian Office and some privately-owned canals divert water above for irrigation.

REGULATION.—Flow affected by irrigation diversions above.

ACCURACY.—Stage-discharge relation changed during each winter; affected by ice December 21, 1918, to March 28, 1919, and November 26, 1919, to March 23, 1920. Rating curves used until winter of 1919–20 well defined; curve for 1920 fairly well defined. Gage read to half-tenths once a day October 1, 1918, to May 6, 1919. Water-stage recorder operated satisfactorily after May 6, 1919, except for periods indicated in footnote to daily discharge table when no record was secured. Daily discharge ascertained by applying mean daily gage height to rating table except for period of ice effect and periods when recorder failed to operate. For ice period, discharge was estimated from one meter measurement, study of weather records and observer's notes. For other periods discharge was interpolated. Records good.

Discharge measurements of Lake Fork near Myton, Utah, during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
1918				1919			
Nov. 15	Jordan and Bones	2.32	77	Sept. 23	Rush and Purton	1.32	15.7
				Dec. 3	A. B. Purton	[a]3.12	72
1919							
Jan. 19	L. W. Jordan	[a]3.60	93	1920			
May 7	do	1.88	43.9	Mar. 12	Dickinson and Carmedy[b]	[a]3.48	90
16	do	2.76	243	May 29	A. B. Purton	4.88	1,270

[a] Stage-discharge relation affected by ice.
[b] Hydrographer for U. S. Indian Service.

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Daily discharge, in second-feet, of Lake Fork near Myton, Utah, for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	28	61	68				255	41	171	11	18	22
2	32	68	73				258	42	86	13	28	46
3	24	61	76				240	46	61	12	33	47
4	20	54	70				231	46	30	9	28	40
5	24	61	61				210	50	26	9	24	40
6	32	68	66				168	64	26	12	26	40
7	218	61	61				185	49	34	13	24	49
8	93	61	93			135	142	33	47	13	23	49
9	76	68	109	85			122	30	35	13	22	108
10	250	68	99				118	29	26	12	28	35
11	188	61	88				108	22	21	12	22	30
12	148	68	93				97	21	29	11	29	31
13	124	68	95				89	20	29	11	24	30
14	113	84	109				97	40	30	10	24	52
15	93	79	113		110		86	101	29	10	21	56
16	61	84	124				88	168	28	9	19	32
17	54	84	126				84	246	27	17	17	29
18	188	97	133				86	287	25	19	16	34
19	124	105	135	93			79	517	24	18	17	33
20	93	107	124				88	745	23	17	20	32
21	76	90					79	906	22	16	19	27
22	84	103				300	51	870	18	15	18	21
23	61	117					82	750	19	14	17	15
24	68	98					50	791	17	14	18	13
25	61	84	100	95			51	504	18	15	17	12
26	68	76					49	450	14	14	16	13
27	68	79					51	512	14	14	16	25
28	61	84					50	714	12	14	15	148
29	68	72			-------	287	51	741	15	15	15	38
30	76	61			-------	287	46	577	16	16	16	30
31	68	-------			-------	300	-------	347	-------	18	17	-------
1919–20												
1	28	40	65				80	75	1,600	80	1,000	80
2	30	51	69				85		1,220	64	190	72
3	31	48	72				82		1,000	74	43	64
4	41	54					92		930	37	19	58
5	31	60					123	50	885	52	18	52
6	33	56				80	141		980	48	17	46
7	34	63					146		1,290	30	20	43
8	38	67					178		1,480	25	21	40
9	36	60	65				167	26	1,580	26	24	37
10	32	58					144	30	1,260	15	23	34
11	37	63					116	26	875	14	21	32
12	31	50				90	112	48	481	13	20	28
13	22	52					121	32	509	13	20	26
14	23	56					134	40	576	16	20	26
15	26	67		60	70		127	62	581	20	20	26
16	36	68					234	82	535	23	20	26
17	40	72					146	53	370	27	20	33
18	38	68				140	127	56	274	30	68	53
19	28	64					127	64	347	26	93	53
20	30	61					132	62	328	24	89	34
21	32	68					123	178	362	27	85	39
22	34	79					124	397	473	31	53	30
23	36	72	55				134	539	423	34	42	39
24	38	76				156	88	477	366	33	32	28
25	40	68				162	68	485	374	32	30	29
26	41					144	66	658	336	31	34	30
27	39					112	58	790	310	30	90	33
28	37	62				85	86	965	308	27	144	37
29	35					93	77	1,210	271	24	129	34
30	34				-------	93	83	1,620	162	24	110	33
31	35	-------			-------	88	-------	1,780	-------	25	95	-------

NOTE.—Water-stage recorder not in satisfactory operation June 15–30, 1919, when only range in stage was recorded, and July 10–15, Oct. 20–25, 27–28, 1919, May 2–8, July 14–17, 24, Aug. 16–17, 20, Sept. 1–5, and 7–10, 1920. Discharge for these periods interpolated.

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Monthly discharge of Lake Fork near Myton, Utah, for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	250	20	88.5	5,440
November	117	54	77.6	4,620
December	135	61	97.1	5,970
January			89.1	5,480
February			110	6,110
March			219	13,500
April	268	46	111	6,610
May	905	20	315	19,400
June	171	12	32.4	1,930
July	19	9	13.4	824
August	38	15	21.5	1,320
September	148	12	38.9	2,310
The year	905	9	102	73,500
1919-20				
October	41	22	33.8	2,080
November	79	40	61.5	3,660
December			60.2	3,700
January			60.0	3,690
February			70.0	4,030
March			111	6,820
April	234	56	117	6,960
May	1,780	26	325	20,000
June	1,600	162	686	40,800
July	80	13	31.5	1,940
August	1,000	17	84.5	5,200
September	80	26	39.3	2,340
The year	1,780	13	139	101,000

UINTA RIVER NEAR WHITEROCKS, UTAH

LOCATION.—In SE. ¼ sec. 31, T. 2 N., R. 1 W., Uinta special base and meridian, 200 feet below Pole Creek bridge on road to Government sawmill, in Duchesne County, 10 miles northeast of Whiterocks, Uinta County. Pole Creek enters on left a short distance above station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 5, 1917, to September 30, 1920, when station was discontinued.

GAGE.—Stevens continuous water-stage recorder on right bank; installed November 5, 1917; inspected by J. F. Wilkin. Also inside and outside vertical enamel staff gages.

DISCHARGE MEASUREMENTS.—Made by wading or from highway bridge.

CHANNEL AND CONTROL.—Channel very rough, steep, and wide. Bed composed of boulders and gravel. Banks low but probably not subject to overflow. Low-water channel meanders over stream bed and probably forms two channels at gage at extreme low water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 5.15 feet on May 29 (discharge, 614 second-feet). Minimum stage recorded, 3.80 feet on February 6 (discharge, 45 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 6.32 feet at midnight May 29 (discharge, 1,300 second-feet). Minimum discharge probably less than 50 second-feet in January when stream was frozen.

1918–1920: Maximum discharge that of May 29, 1920, and minimum discharge that of February 6, 1919.

ICE.—Stream freezes over each winter.

DIVERSIONS.—Above all diversions except Cedar View canal which diverts from the right side a quarter of a mile above station. Records of discharge of this canal for the irrigation seasons accompany records for this station.

REGULATION.—None.

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ACCURACY.—Stage-discharge relation changed May 8, 1919; affected by ice each winter. Rating curves fairly well defined between 60 and 600 second-feet. Operation of water-stage recorder unsatisfactory for periods when daily discharge is not given in table. During these periods weekly staff gage readings were secured and discharge interpolated. Daily discharge ascertained by applying to rating table the mean daily gage height determined from recorder graph, shifting-control method used June 1 to September 30, 1920. Discharge for winter periods estimated. Records fair.

Records of discharge of Cedar View canal for the irrigation seasons are published with this station to supplement the records of flow at the station as this is the only diversion in the Uinta River basin above this station. The records of daily discharge of this canal were furnished by C. C. Jacob, Federal court water commissioner.

Discharge measurements of Uinta River near Whiterocks, Utah, during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
1918				1919			
Nov. 11	Jordan and Bones	4.12	102	Sept. 24	Rush and Purton	4.15	123
				Dec. 12	A. B. Purton	[a] 4.78	70
1919				1920			
Jan. 22	L. W. Jordan	[a] 4.20	58	Mar. 21	W. E. Dickinson	3.92	69
May 16	Do	5.04	554				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Uinta River near Whiterocks, Utah, for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19										
1	135	138				178			197	
2	138	138							247	
3	150	135			60			234	312	
4	222	135					293		238	
5	222	122								163
6	294	125	45							
7	293	118							185	
8	232	122				272				
9	218	115						171		
10	218	118			54			167		
11	191	115					368	181		189
12	178	118						178		169
13	166	115	60	60				189		156
14	166	115				421		189	167	156
15	162	118				514		178		153
16	170	108				552		205		156
17	204	105			52			189		153
18	204	118						201		160
19	191	118						171		160
20	182	112		60			293	163		153
21	187	105						156	143	146
22	178	105				586		156		139
23	178	92						149		136
24	170				138			153		133
25	158							163		130
26	150						247	156		127
27	142			70				146		136
28	158							149	149	225
29	146					614		181		221
30	146							189		209
	142							185		

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Daily discharge, in second-feet, of Uinta River near Whiterocks, Utah, for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919-20										
1	189	111					934	453	274	185
2	181	108				114	820	432	251	181
3	189	105					754	437	265	174
4	178	102					766	426	288	171
5	156	98					856	400	283	189
6	156	95					910	384	274	205
7	153	103					940	353	256	193
8	143	109					980	353	243	193
9	139	100					990	348	256	197
10	129	123				185	874	332	260	193
11	133	117					713	332	229	181
12	136	123					678	317	238	171
13	136	123					689	322	221	160
14	143	129					684	303	205	153
15	146	114					614	298	201	149
16	136	109					614	327	197	146
17	129	103				238	552	342	193	156
18	127	100		74			514	327	217	193
19	129	100					502	337	260	156
20	117	100			64		492	322	238	143
21	123	97		69			486	312	217	111
22	120	97					524	312	197	
23	120	97				637	558	342	189	
24	120	92					524	353	181	
25	127	89		64	64		497	332	185	
26	123	92				862	464	298	265	
27	111	88				922	497	279	265	
28	117	84				1,050	502	269	279	
29	127	80				1,130	497	256	243	
30	111	80				1,160	492	251	213	
31	103			69		1,100		265	197	

NOTE.—See "accuracy" paragraph for days for which no discharge is given.

Monthly discharge of Uinta River near Whiterocks, Utah, for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	294	135	184	11,300
November	138		111	6,600
December			75	4,600
January			60	3,700
February			55	3,100
March			62	3,800
April			84	5,000
May			452	27,800
June			313	18,600
July		146	183	11,300
August	312		173	10,600
September	225	127	162	9,600
The year			160	116,000
1919-20				
October	189	103	137	8,420
November	129	80	102	6,070
December			66	4,060
January			50	3,070
February			50	2,880
March			65	4,000
April			75	4,460
May	1,160		434	26,700
June	990	464	664	39,500
July	453	251	336	20,700
August	288	181	235	14,400
September	205		155	9,220
The year	1,160		198	143,000

NOTE.—Monthly means estimated December, 1918, to July, 1919, and December, 1919, to June, 1920, recorder not working properly and for ice effect.

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Daily discharge, in second-feet, of Cedar View canal near Whiterocks, Utah, for the irrigating seasons, 1919 and 1920

Day	May	June	July	Aug.	Sept.	Day	May	June	July	Aug.	Sept.
1919						1920					
1	3	10	4	5	3	1	4	30	22	6	
2	3	10	4	5	3	2	6	28	22	6	
3	3	9	4	5	3	3	8	26	22	6	
4	3	4	4	4	3	4	8	26	22	6	
5	3	4	4	4	3	5	8	28	21	7	
6	17	4	4	4	3	6	8	30	20	7	
7	17	4	4	4	3	7	3	30	20	7	
8	17	4	4	4	6	8	3	31	9	7	7.5
9	17	4	4	4	10	9	3	31	9	7	
10	17	4	4	4	10	10	4	31	9	7	
11	17	4	4	4	10	11	4	28	9	7	
12	13	4	4	4	10	12	4	28	9	7	
13	8	4	4	4	10	13	4	28	9	7	
14	8	4	4	4	10	14	4	28	9	7	
15	12	4	4	4	10	15	4	26	6	7	
16	22	4	4	4	-------	16	4	26	5	7	-------
17	22	4	4	4	-------	17	4	25	5	6	-------
18	25	4	4	4	-------	18	4	24	5	6	-------
19	30	4	5	4	-------	19	6	24	5	6	-------
20	40	4	5	4	-------	20	7	24	5	6	-------
21	42	4	5	3	-------	21	10	23	5	6	-------
22	46	4	5	3	-------	22	11	22	5	6	-------
23	39	4	5	3	-------	23	16	27	5	6	-------
24	42	4	5	3	-------	24	19	26	5	6	-------
25	38	4	5	4	-------	25	20	25	5	6	-------
26	38	4	5	4	-------	26	20	23	5	6	-------
27	41	4	5	4	-------	27	24	25	5	6	-------
28	48	4	5	4	-------	28	23	25	5	6	-------
29	48	4	4	4	-------	29	20	25	5	6	-------
30	42	4	5	3	-------	30	19	26	5	6	-------
31	36	-------	5	3	-------	31	22	-------	5	6	-------

Monthly discharge of Cedar View canal near Whiterocks, Utah, for the irrigation seasons, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
May	48	3	24.4	1,500
June	16	4	5.0	298
July	5	4	4.4	270
August	5	3	3.9	240
September 1-15	10	3	6.5	192
The period				2,500
1920				
May	24	3	9.8	603
June	31	22	26.6	1,580
July	22	5	9.6	591
August	7	6	6.4	393
September 1-15			7.5	223
The period				3,390

UINTA RIVER NEAR FORT DUCHESNE, UTAH

LOCATION.—In W. ½ sec. 35, T. 2 S., R. 1 E., Uinta special base and meridian, 100 feet below heading of Fort Duchesne canal and 2 miles south of Fort Duchesne, Uinta County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 11, 1917, to September 30, 1920, fragmentary. Station discontinued.

GAGE.—Vertical staff on left bank May 11 to June 11, 1917, at about same site as recorder station later established. Vertical staff at Fort Duchesne June 27 to July 13, 1917. October 23, 1917, to September 30, 1920, Stevens continuous recorder on right bank 100 feet below heading of Fort Duchesne canal. Recorder supplemented by vertical staff gage in stilling well and inclined staff gage on river bank 10 feet downstream.

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DISCHARGE MEASUREMENTS.—Made from cable or by wading near gage.

CHANNEL AND CONTROL.—Channel very rough, composed of heavy gravel and cobbles, subject to considerable change during high water.

EXTREMES OF DISCHARGE.—Not determined for period May 11 to July 13, 1917.

Maximum stage during year ending September 30, 1918, from water-stage recorder, 6.45 feet at 7 a. m. July 14 (discharge, 1,590 second-feet). River dry during parts of April, May, July, August, and September.

Maximum stage during year ending September 30, 1919, from water-stage recorder, 5.33 feet at 11 p. m. October 6 (discharge, 523 second-feet). River dry during most of the summer.

Maximum stage during year ending September 30, 1920, from water-stage recorder, 7.86 feet at 10 a. m. May 31 (discharge, 3,100 second-feet). River dry during parts of July, August, and September.

1917–1920: It is estimated that discharge exceeded 7,500 second-feet in June, 1917. River dry a part of each summer.

ICE.—Stream is affected by ice each winter.

DIVERSIONS.—Station is below all diversions from Uinta River.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent; affected by ice each winter. Rating curves poorly defined. In 1917 staff gages were read daily to hundredths. During 1918–1920 recorder was in operation only during periods for which daily discharge is given continuously in table. River staff gage was read at intervals at other times. Daily discharge ascertained by applying to rating table the mean daily gage height determined from recorder graph. Records fair.

Discharge measurements of Uinta River near Fort Duchesne, Utah, during the period May 11, 1917, to Nov. 1, 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1917		*Feet*	*Sec.-ft.*	1919		*Feet*	*Sec.-ft.*
May 11	A. B. Purton	[a] 1.51	75	Jan. 21	L. W. Jordan	[d] 6.25	101
26	E. S. Borgquist	[a] 2.45	455	May 11	do	3.82	23.8
June 27	do	[b] 4.52	4,050	Sept. 26	A. B. Purton	3.40	[e] 1
July 13	L. W. Jordan	[b] 0.83	337	Dec. 13	do	[d] 5.45	110
Nov. 15	E. S. Borgquist	[c] 4.46	111	1920			
1918				Mar. 22	W. E. Dickinson	4.73	137
Feb. 14	J. J. Sanford	[d] 4.54	64	May 30	A. B. Purton	7.70	2,920
Apr. 18	R. P. Flagel	3.83	20.2	Nov. 1	do	4.83	150
June 15	A. B. Purton	5.24	446				
Aug. 3	J. W. Bones	3.40	[e] 2				
Nov. 7	Jordan and Bones	4.66	119				

[a] Gage height refers to gage used May 11 to June 11, 1917.
[b] Gage height refers to gage used June 27 to July 13, 1917.
[c] This and subsequent gage heights refer to gage installed Oct. 23, 1917.
[d] Stage-discharge relation affected by ice.
[e] Discharge estimated.

Daily discharge, in second-feet, of Uinta River near Fort Duchesne, Utah, for the years ending Sept. 30, 1917–1920

Day	May	June	July	Day	May	June	July	Day	May	June	July
1917				1917				1917			
1		400	1,800	11	75	2,200	480	21	340		
2		370	1,270	12	68		380	22	490		
3		370	1,180	13	73		337	23	520		
4		400	1,000	14	73			24	540		
5		400	920	15	210			25	560		
6		420	770	16	280			26	455		
7		410	710	17	330			27	440	4,050	
8		500	580	18	360			28	400	4,020	
9		1,200	550	19	340			29	390	3,720	
10		1,700	510	20	340			30	370	2,850	
								31	400		

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Daily discharge, in second-feet, of Uinta River near Fort Duchesne, Utah, for the years ending Sept. 30, 1917–1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1917–18												
1		98	101					8	51		8	
2		101	101					14	120		5	
3		107	104				35	18	540	0	2	
4		104	107					12	778			
5		107	107					10	964	4		
6		104	98				35		778			
7		115	93				35	5	1,010			
8		140	107				33		964	0		
9		129	107				32	8	1,070			
10		115	104				30	17	1,160	66		
11		118	112				30	5	1,190	147		0
12		112	118				30	3	983	118		
13		112	118				30	1	574	496		
14		112	118		64		29	0	531	1,240		
15		112	118			56	28	0	420	600		
16			118				24	2	362	429		
17			110				23	36	438	328		
18						51	22	48	254	232	0	
19		110					22	34	306	163		
20						46	26	32	284	118		
21						42	24	62	337	96		
22						39	21	57	276	112		
23	86	107				35	12	39	243	90		10
24	88	107					10	107	583	63		213
25	90	98				35	5	328	291	49		63
26	88	98					2	321	88	42		45
27	84	88					0	186	50	36		40
28	82	93				35	0	66	30	22		36
29	74	96				35	4	30	16	20		34
30	69	101				35	8	6	4	16		34
31	90					35		15		12		
1918–19												
1	33	77					50					0
2	34	79							0			
3	38	80								0		
4	67	86						78				
5	136	98							0		0	
6	186	98										
7	238	101					42		30			
8	136	90						3				0
9	125	104								0		
10	150	107							0		0	
11	112	112						24				
12	93	110					0					0
13	76	101						90	0	0		
14	72	104										
15	67	110									0	
16	63	112							1			
17	76	78								0		0
18	181	90					50					
19	90	115										
20	74	104						107	0			
21	80	90		101						0		0
22	78	90										
23	70	59						70				
24	67	67										
25		76					45				0	
26		132						56				1
27									1	0		5
28	72	116						0				126
29						67		0				49
30		101					50		1			59
31										0		

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Daily discharge, in second-feet, of Uinta River near Fort Duchesne, Utah, for the years ending Sept. 30, 1917–1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919–20												
1		62					70	33	2,160	69		32
2	22						69	30	1,690	55		32
3							69	32	1,480	50		30
4							69	32	1,250	45		34
5							60	34	1,730	40		40
6							51	36	1,850	36		43
7							55	36	1,810	32	0	45
8	27	78					57	36	1,860	24		45
9							57	37	1,880	12		
10							57	39	1,600	0		
11							54	40	1,270			210
12	29						48	40	1,040			0
13			110				44	40	916			
14						125	41	34	823		10	
15							40	30	778		20	
16							52	28	653		20	
17	34						86	29	549		17	
18							59	35	420		17	10
19							48	52	261		17	
20						96		118	186		18	
21	37							254	143	0	19	
22						118	42	523	112		19	
23						104		715	115		22	
24						93		787	140		22	
25						76	36	1,020	115		20	0
26						74		1,290	86		20	
27						78	36	1,460	72		24	
28	37					80		1,690	74		26	
29						76		1,990	70		27	59
30	64					74	36	2,480	78		28	
31						74		2,540			30	

NOTE.—Gage washed out June 12–26, 1917, no record. Discharge interpolated June 10, 1917. No record July 15 to Oct. 22, 1917. Ice in well, recorder not working; staff gage reading used for discharge Dec. 18, 1917, to Apr. 14, 1918, Nov. 26, 1918, to May 11, 1919, and Nov. 12, 1919, to Mar. 21, 1920. Water below intake pipe; discharge estimated or taken from staff readings Apr. 25–29, May 6–8, 11–15, 1918, and May 29, 1919, to Sept. 26, 1919. Recorder not working properly; discharge estimated or staff gage readings used Nov. 16–22, 1917, Oct. 25 to Nov. 2, 1918, May 11–28, Sept. 27 to Nov. 8, 1919, Apr. 20 to May 1, and Sept. 9–30, 1920.

Monthly discharge of Uinta River near Fort Duchesne, Utah, for the years ending Sept. 30, 1917–1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1917				
May 11–31			336	14,000
June			* 4,000	* 240,000
July 1–13			808	20,700
The period				275,000
1917–18				
October 23–31	90	69	88.4	1,490
November	140	88	108	6,430
December 1–17	118	93	109	3,650
March 15–31			41.3	1,390
April		0	23.0	1,370
May	328	0	47.7	2,930
June	1,190	4	492	29,300
July	1,240	0	145	8,920
August	8	0	0.5	31
September	213	0	15.8	940

* Estimated.

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Monthly discharge of Uinta River near Fort Duchesne, Utah, for the years ending Sept. 30, 1917–1920—Continued

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	228	33	91.8	5,640
November		59	97.1	5,780
April		0	*40	2,380
May		0	*60	3,690
June	30	0	*2	119
July	0	0	0	0
August	0	0	0	0
September	126	0	7.7	458
1919–20				
October			*35	2,150
March 22–31	118	74	84.7	1,680
April	86		50.4	3,000
May	2,540	28	501	30,800
June	2,160	70	839	49,900
July	69	0	11.7	719
August	30	0	12.1	744
September		0	*35	2,080

* Estimated.

NOTE.—No record for months which do not appear in the above table.

WHITEROCKS CREEK NEAR WHITEROCKS, UTAH

LOCATION.—In SE. ¼ sec. 19, T. 2 N., R. 1 E., Uinta special base and meridian; 6 miles north of Whiterocks, Uinta County. United States Whiterocks canal diverts from left side a quarter of a mile above, and Farm Creek canal from right side 600 feet below station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 8, 1917, to September 30, 1920.

GAGE.—Stevens continuous water-stage recorder on right bank; installed November 8, 1917; inspected by Mrs. W. H. Koehler. Also inside and outside vertical enamel staff gages.

DISCHARGE MEASUREMENTS.—Made by wading or from cable near gage.

CHANNEL AND CONTROL.—Channel is wide and indefinite. A number of by-channels carry water during flood season. Stream bed is steep and rough; composed of boulders and gravel. Channel is subject to considerable change by erosion during high water.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30 1919, from water-stage recorder, 5.38 feet at 11.30 p. m. May 14 (discharge, 520 second-feet). Minimum discharge, 21 second-feet July 10, 22, 23, 27, 28 and August 21.

Maximum stage during year ending September 30, 1920, from water-stage recorder, 7.04 feet at 10 p. m. May 29 (discharge, 1,440 second-feet). Minimum discharge probably less than 25 second-feet in January.

1918–1920: Maximum discharge that of May 29, 1920. Minimum discharge that of July 10, 22, 23, 27, 28 and August 21, 1919.

ICE.—Stream freezes over each winter.

DIVERSIONS.—Above all diversions except United States Whiterocks canal ·erts from left bank just above this station. Records of discharge ıal for the irrigation season accompany the records for this station.

–None.

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ACCURACY.—Stage-discharge relation permanent except as affected by ice each winter. Rating curve well defined below 800 second-feet and extended above. Operation of water-stage recorder satisfactory only during periods for which daily discharge is given continuously in tables; weekly staff gage readings used for other periods. Daily discharge ascertained by applying to rating table daily mean gage height determined from recorder graph. Discharge for winter periods estimated from meter measurements, weather records, and observer's notes; for other periods interpolated between values obtained from weekly gage readings; July 12–13, August 30 to September 2, 1919, May 24 and September 3–4, 1920, interpolated. Records good.

Records of discharge of the United States Whiterocks canal for the irrigation seasons are published with this station to supplement the records of flow at the station as this is the only diversion in the Whiterocks Creek basin above this station. The records of daily discharge of this canal were furnished by C. C. Jacob, Federal court water commissioner.

Discharge measurements of Whiterocks Creek near Whiterocks, Utah, during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1918		*Feet*	*Sec.-ft.*	1919		*Feet*	*Sec.-ft.*
Nov. 8	Jordan and Bones	3.93	62	Dec. 12	A. B. Purton	*4.09	43.9
1919				1920			
Jan. 22	L. W. Jordan	*4.05	30.1	Mar. 20	W. E. Dickinson	3.86	49.4
May 13	do	4.72	250	May 25	Purton and Jacob	5.80	728
Sept. 23	Rush and Purton	3.68	31.0				

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Whiterocks Creek near Whiterocks, Utah, for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	59	69	------	------	------	------	37	169	132	24	30	24
2	61	69	------	------	------	------	37	264	110	24	31	25
3	62	66	------	------	------	------	37	323	90	24	42	25
4	134	64	------	------	------	------		354	72	23	32	25
5	119	56	------	------	------	------		346	56	23	27	28
6	128	61	------	------	------	------		191	39	23	24	33
7	117	56	------	------	------	------	35	159	38	23	24	100
8	98	59	------	------	------	------		182	37	22	24	86
9	94	55	------	------	------	------		199	40	22	30	66
10	98	53	------	------	------	------	32	161	37	21	33	50
11	83	53	------	------	------	------		146	34	22	27	42
12	77	49	------	------	------	------		221	32	22	24	39
13	72	49	------	------	------	------		296	30	23	24	37
14	70	50	------	------	------	------	34	354	30	23	24	39
15	69	50	------	------	------	------		387	28	22	23	37
16	72	46	------	------	------	------		354	28	24	22	35
17	96	38	------	------	------	------	35	334	27	24	22	34
18	102	52	------	------	------	------		342	27	24	23	35
19	90	49	------	------	------	------		334	27	22	23	37
20	81	49	------	------	------	32		315	27	22	22	33
21	79	45	------	------	------	------	65	308	27	22	22	31
22	76	42	------	30	------	------		264	26	21	22	30
23	70	39	------	------	------	------		250	26	21	22	31
24	69	41	------	------	------	------	102	260	25	22	21	31
25	62	42	------	------	------	------	102	224	25	22	22	30
26	61	43	------	------	------	------	100	196	25	22	22	30
27	64	39	------	------	------	37	86	196	25	21	23	34
28	77	38	------	------	------	------	72	208	24	21	23	90
29	72	37	------	------	------	------	81	221	24	37	23	86
30	72	36	------	------	------	------	98	211	24	41	23	66
31	67	------	------	------	------	------	------	169	------	32	24	------

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Daily discharge, in second-feet, of Whiterocks Creek near Whiterocks, Utah, for the years ending Sept. 30, 1919 and 1920—Continued

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919–20												
1	50	59						40	1,070	179	49	30
2	49	66						41	835	161	45	30
3	53	66							697	156	45	32
4	52	64							641	161	45	34
5	50	64							808	151	43	36
6	48	59					45	55	819	144	42	------
7	58	59							884	110	42	------
8	83	59							1,010	96	42	------
9	81					50		72	1,040	92	53	------
10	72								819	85	81	------
11	72						49		636	86	48	------
12	70							83	636	86	52	31
13	70								656	69	58	------
14	72	55							671	61	43	------
15	67				30		39		553	58	40	------
16	64		40	25				94	483	66	40	------
17	61								387	90	38	------
18	59					56	29		296	74	42	------
19	77	56				53			254	77	58	------
20	66					50		225	237	81	50	30
21	81						28		208	64	42	------
22	72					50			208	67	38	------
23	70							506	254	86	35	------
24	69							620	240	79	34	------
25	72	53				49	28	728	205	77	39	------
26	72							984	182	64	43	------
27	62							890	205	56	52	------
28	64					45	35	1,130	211	52	49	------
29	70							1,290	211	48	40	27
30	64				------			1,220	224	43	34	------
31	56	------			------	42	------	1,240	------	46	31	------

Monthly discharge of Whiterocks Creek near Whiterocks, Utah, for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	134	59	82.3	5,060
November	69	36	49.8	2,960
December	------	------	*35	2,150
January	------	------	*30	1,840
February	------	------	*30	1,670
March	------	------	*32	1,970
April	------	------	54.1	3,220
May	387	146	256	15,700
June	132	24	39.7	2,360
July	41	21	23.8	1,460
August	42	21	25.1	1,540
September	100	24	43.0	2,560
The year	387	21	58.8	42,300
1919–20				
October	83	48	65.4	4,020
November	66	------	56.2	3,340
December	------	------	*40	2,460
January	------	------	*25	1,540
February	------	------	*30	1,730
March	------	------	49.2	3,030
April	------	------	37.8	2,250
May	1,290	------	354	21,800
June	1,070	182	519	30,900
[illegible]	179	43	89.2	5,480
[illegible]	81	31	44.9	2,760
[illegible]	------	------	*30	1,790
[illegible]	1,290	------	112	81,100

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Daily discharge, in second-feet, of United States Whiterocks canal for the irrigation seasons of 1919 and 1920

Day	May	June	July	Aug.	Sept.	Day	May	June	July	Aug.	Sept.
1919						1920					
1			38	65	63	1		51	40	42	
2		36	38	65	63	2		49	40	41	
3	12		23	65	63	3		51	40	39	
4			36	65	63	4		54	40	38	
5	12		38	65	63	5	16	53	39	30	
6			38	57	51	6	16	49	35	25	
7			38	40	51	7	21	64	39	25	
8			38	65	51	8	28	44	47	26	
9			38	61	51	9	33	50	50	28	
10			37	67	51	10	35	59	54	30	
11			40	63	51	11	33	54	68	27	
12			38	68	55	12	38	54	68	12	
13	38		38	63	55	13	36	59	70	7	
14		51	38	46	55	14	35	63	68	20	
15			38	53	51	15	28	56	68	18	
16			38	51		16	25	56	68	18	
17		47	38	51		17	26	49	68	18	
18			36	51		18	46	54	64	24	
19			36	51		19	47	62	60	21	
20			36	51		20	40	58	56	16	
21			36	51		21	38	66	52	16	
22			39	51		22	42	77	52	14	
23	44		38	51		23	42	4	52	13	
24			38	54		24	43	4	52	13	
25			38	57		25	44	40	52	12	
26			38	59		26	44	33	52	14	
27			45	65		27	50	40	55	18	
28	51		53	65		28	45	40	49	21	
29			53	59		29	48	40	40	24	
30		41	65	59		30	44	28	40	23	
31			65	60		31	49		40	21	

Monthly discharge of United States Whiterocks canal near Whiterocks, Utah, for the irrigation seasons 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
July	65	23	40.2	2,470
August	67	40	57.9	3,580
September 1-15	63	51	55.8	1,660
The period				7,680
1920				
May 5-31	50	16	36.7	1,970
June	77	4	48.7	2,900
July	70	35	52.2	3,210
August	42	7	22.4	1,380

PRICE RIVER NEAR HELPER, UTAH

LOCATION.—In sec. 36, T. 13 S., R. 9 E., at ford about 300 feet west of Denver & Rio Grande Western Railroad main line at Spring Glenn, 2 miles south of Helper, Carbon County, 1 mile above diversion dam of Price River Irrigation Co., and 4 miles below White Creek.

DRAINAGE AREA.—530 square miles (measured on topographic map).

RECORDS AVAILABLE.—February 21, 1904, to September 30, 1920.

GAGE.—Vertical staff on left bank; installed July 16, 1907; to replace old chain gage washed out April 11, 1907, read by D. S. Rowley. See previous water supply paper for data on previous gages.

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DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Bed of stream composed of gravel and fine sand. Control is a riffle immediately below ford; shifts.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 10.0 feet at 5 p. m. September 8, from levels made later to high-water mark (discharge not determined). Minimum stage recorded, 2.08 feet at 4 p. m. February 8 (discharge, 16 second-feet).

Maximum stage during year ending September 30, 1920, occurred at time of short flood on August 19 when water was over top of gage. Discharge not determined. Minimum stage recorded, 2.48 feet on November 8 (discharge, 19 second-feet).

1904–1920: Maximum stage recorded, 10.0 feet at 5 p. m. September 8, 1919, from levels to high-water mark (discharge not determined). Maximum stage recorded for which discharge was determined, 8.43 feet at 9 p. m. June 25, 1917, determined by leveling from hub set at high-water mark (discharge determined from extension of rating curve, 8,500 second-feet). Minimum stage recorded, 3.1 feet (old chain gage) during December, 1905, and January, 1906 (discharge, 4 second-feet).

ICE.—Stage-discharge relation affected by ice for short periods nearly every winter.

DIVERSIONS.—Main diversions from Price River are below station.

REGULATION.—The Mammoth reservoir of the Price River Irrigation Co. on Gooseberry Fork, about 40 miles above station, had a capacity of about 11,000 acre-feet. Flow of river was affected by storage at this reservoir until after June 24, 1917, when dam broke.

ACCURACY.—Stage-discharge relation changed frequently; affected each year by ice for short periods from November to March. Rating curves fairly well defined. Gage read to hundredths once a day and oftener during periods of rapidly changing stage. Occasional days when gage was not read are indicated in footnote to daily-discharge table. Daily discharge ascertained by applying mean daily gage height to rating table, except for period when shifting-control method was used. Discharge for periods of ice effect and for days when gage was not read was interpolated or estimated. Records fair.

Discharge measurements of Price River near Helper, Utah, during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1918		*Feet*	*Sec.-ft.*	1919		*Feet*	*Sec.-ft.*
Oct. 16	J. W. Bones	2.33	38.4	Aug. 31	W. E. Dickinson	2.56	19.7
1919				Sept. 12	do	2.75	25.6
Jan. 30	L. W. Jordan	2.20	25.1	1920			
Apr. 3	do	3.28	279	Feb. 27	do	2.54	28.6
26	do	3.81	542	May 12	do	4.14	656
May 6	do	4.36	35	June 9	do	3.70	507
29	J. W. Bones	3.38	240	14	do	3.36	352

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Daily discharge, in second-feet, of Price River near Helper, Utah, for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918-19												
1	31	54	45	40	25	61	310	772	231	45	245	630
2	31	58	43	40	23	33	352	780	216	45	424	660
3	31	58	44	40	23	31	289	812	196	45	79	83
4	83	61	46	40	22	31	251	910	183	42	38	44
5	79	51	48	38	23	31	310	946	164	40	38	36
6	68	43	50	35	27	31	247	879	158	40	36	53
7	58	43	51	33	27	31	228	811	152	40	36	213
8	54	43	51	32	16	27	210	743	152	37	29	1,500
9	51	43	61	31	45	29	193	675	136	37	26	173
10	91	43	56	30	27	29	172	660	123	36	24	33
11	56	40	51	29	58	38	206	660	102	36	26	31
12	40	43	51	35	44	39	190	630	102	40	22	26
13	39	43	51	39	31	40	184	616	97	35	22	22
14	38	43	51	43	33	45	178	602	89	35	20	22
15	35	40	51	58	45	27	172	588	85	35	20	20
16	39	45	48	31	38	45	178	574	81	37	20	20
17	187	45	48	31	45	33	184	560	70	40	20	26
18	64	45	47	31	45	48	206	521	67	40	20	67
19	61	54	46	31	27	51	237	508	70	37	26	38
20	61	54	45	35	29	68	270	471	74	37	20	36
21	74	45	45	38	31	98	310	447	74	35	20	33
22	64	45	53	29	33	91	375	413	70	32	20	31
23	61	45	61	33	35	109	424	402	60	30	20	31
24	54	39	61	31	45	109	451	360	57	30	20	29
25	54	33	61	27	54	158	537	370	54	28	20	29
26	54	27	61	29	54	184	537	321	54	28	20	29
28	54	31	54	31	40	150	537	269	54	28	20	29
28	64	37	50	33	33	216	508	253	51	28	20	85
29	50	43	45	40	------	375	537	253	40	30	20	50
30	45	45	40	26	------	424	600	253	40	40	20	44
31	54	------	40	23	------	270	------	253	------	40	20	------
1919-20												
1	41	38	26	28	32	36	31	281	1,220	147	62	56
2	41	36	28	28	30	38	38	294	1,129	126	158	53
3	38	33	30	32	28	41	20	396	973	121	278	44
4	38	38	36	40	28	33	44	391	883	116	190	42
5	41	26	38	32	28	26	136	384	820	114	85	44
6	41	24	26	28	28	20	268	402	804	111	62	116
7	38	29			28	20	281	453	780	102	62	81
8	38	19			38	23	459	521	740	98	62	74
9	38	26			29	31	79	595	595	94	94	70
10	38	24			28	36	87	675	550	89	47	53
11	38	26			28	36	95	737	473	81	34	47
12	38	25	25	25	28	44	99	656	429	81	34	47
13	38	26			28	44	95	705	334	77	32	44
14	38	26			28	130	113	1,010	339	77	32	47
15	38	26			28	20	108	829	352	74	30	42
16	38	26			28	20	99	874	318	70	26	34
17	38	26			28	20	86	982	293	68	26	350
18	38	24	36		28	19	72	1,160	318	66	56	70
19	36	26	36	26	28	19	62	1,450	270	62	1,000	56
20	38	27	36	37	28	31	75	1,710	255	62	213	47
21	38	28	36	32	29	37	68	1,800	240	59	102	44
22	38	29	36	28	30	106	72	1,850	226	54	62	47
23	38	26	36	28	50	44	58	1,910	213	50	81	50
24	38	26	31	28	33	31	56	1,970	200	50	70	50
25	38		29	28	29	38	65	2,000	181	70	725	50
26	38		29	28	23	41	65	1,960	167	62	136	50
27	38	25	26	28	22	31	68	1,830	181	44	74	50
28	33		25	25	36	23	68	1,720	158	36	62	47
29	28		26	28	36	29	95	1,560	158	42	59	44
30	38		25	25	------	33	173	1,490	152	44	59	44
31	38	------	27	32	------	44	------	1,320	------	44	59	------

NOTE.—Stage-discharge relation affected by ice Nov. 24-25, 28, Dec. 3-6, 10, 14, 17-20, 22, 24-25, 28-29, 31, 1918, Jan. 6, 9-10, 18, 26, Feb. 21-22, 24, Mar. 4, 12, Nov. 14, 20-21, 25-30, Dec. 1-3, 7-17, 22, 28, and 30, 1919, Jan. 7-18, and Mar. 5, 1920. Gage not read Oct. 6, Dec. 13, 1918, Jan. 3, 6, 8, 13, 27, Feb. 12, Apr. 1, 7, 14, May 7 and 8, Dec. 19, 21, 1919, Jan. 21, Apr. 17, and July 22, 1920. Discharge for these periods estimated or interpolated.

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Monthly discharge of Price River near Helper, Utah, for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	187	31	58.9	3,620
November	61	27	44.6	2,650
December	61	40	50.2	3,090
January	58	23	34.3	2,110
February	58	16	34.9	1,940
March	424	27	95.2	5,850
April	600	172	313	18,600
May	946	253	558	34,300
June	231	40	103	6,120
July	45	28	36.4	2,240
August	424	20	45.6	2,800
September	1,500	20	137	8,150
The year	1,500	16	126	91,500
1919–20				
October	41	33	38.0	2,340
November	38	19	27.3	1,620
December	38	----------	28.8	1,770
January	40	----------	27.7	1,700
February	50	22	29.4	1,690
March	130	19	36.9	2,270
April	459	20	104	6,190
May	2,000	281	1,090	67,000
June	1,220	152	456	27,200
July	147	36	77.1	4,740
August	1,000	26	131	8,060
September	350	34	63.1	3,750
The year	2,000	----------	177	128,000

FISH CREEK NEAR SCOFIELD, UTAH

LOCATION.—In sec. 10, T. 12 S., R. 7 E., three-quarters of a mile above railroad siding at Hale, about 5 miles northeast of Scofield, Carbon County, and 10 miles above confluence with White River to form Price River.

DRAINAGE AREA.—163 square miles (measured on United States Forest Service map, 1920).

RECORDS AVAILABLE.—November 17, 1917, to September 30, 1920.

GAGE.—Stevens eight-day water-stage recorder on left bank 85 feet below railroad bridge installed November 17, 1917; inspected by J. E. Jensen. Also inside and outside vertical enamel staff gages.

DISCHARGE MEASUREMENTS.—Made by wading or from either railroad bridge near gage or road bridge 1 mile upstream.

CHANNEL AND CONTROL.—One channel at all stages. Right bank is a high rock cliff; left bank lower but probably not subject to overflow. Railroad embankment a few feet back from left bank can not be overflowed. Stream bed gravel and sand. Riffle a short distance below gage forms control, shifting during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 8.22 feet at 8 a. m. May 4 (discharge, 494 second-feet). Minimum discharge not determined.

Maximum stage during year ending September 30, 1920, 10.4 feet about May 24 from high-water mark in gage house (discharge, about 1,000 second-feet). Minimum discharge occurred during winter. Discharge on January 30 was 10.4 second-feet by meter measurement.

1918–1920: Maximum discharge that of May 24, 1920. Minimum discharge not determined.

—Stream freezes over each winter.

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DIVERSIONS.—No information. Probably some small diversions for irrigation above station.

REGULATION.—None since the failure on June 24, 1917, of the Mammoth reservoir dam on Gooseberry Fork, a tributary to Fish Creek. This reservoir had a capacity of about 11,000 acre-feet and was used by the Price River Irrigation Co. to store water for irrigation near Price, Utah.

ACCURACY.—Stage-discharge relation changed about May 24, 1920, by high water; affected by ice October 27, 1918, to March, 1919, and November 6, 1919, to April, 1920. Rating curves well defined below 400 second-feet and extended above. Operation of water-stage recorder satisfactory except for periods indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph. Discharge not determined November 1, 1918, to March 31, 1919, and November 6, 1919, to April 24 and 26–28, 1920. Records good.

Discharge measurements of Fish Creek near Scofield, Utah, during the years ending Sept. 30, 1919 and 1920.

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1918		*Feet*	*Sec.-ft.*	1920		*Feet*	*Sec.-ft.*
Oct. 16	J. W. Bones	5.18	23.3	Jan. 30	J. W. Bones	* 5.15	10.4
1919				May 16	W. E. Dickinson	7.47	338
Jan. 14	L. W. Jordan	* 5.45	16.3	June 8	do	7.56	401
Mar. 31	do	6.62	190	15	do	6.55	194
June 3	J. W. Bones	6.21	122				
Aug. 30	W. E. Dickinson	4.84	12.6				
Sept. 13	do	4.86	13.7				

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Fish Creek near Scofield, Utah, for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Apr.	May	June	July	Aug.	Sept.
1918–19								
1		--------	156	379	153	24	26	16
2		--------	190	419	140	24	24	25
3	30	--------	183	456	127	23	25	25
4		--------	137	474	116	21	22	20
5		--------	130	468	109	20	18	16
6		--------	109	458	103	20	17	15
7	44	--------	98	428	98	20	16	16
8	28	--------	98	419	91	18	16	16
9	35	--------	98	417	82	18	18	15
10	45	--------	95	426	76	17	21	15
11	29	--------	90	407	68	17	19	14
12	26	--------	83	396	64	17	16	13
13	24	--------	88	392	57	18	16	13
14	23	--------	95	388	53	18	16	13
15	23	--------	94	388	49	18	14	14
16	23	--------	92	388	45	18	14	28
17	24	--------	90	377	44	19	15	18
18	29	--------	95	362	41	18	16	16
19	25	--------	114	352	39	16	16	18
20	23	--------	140	329	39	16	15	17
21	22	--------	168	308	37	16	14	16
22	22	--------	207	288	36	16	13	15
23	22	--------	245	270	34	16	13	15
24	22	--------	248	254	32	16	13	15
25	22	--------	277	243	30	17	13	16
26	20	--------	270	225	29	16	13	16
27		--------	279	207	27	16	14	16
28		--------	275	190	25	16	15	26
29	20	--------	301	178	24	18	14	26
30		--------	335	188	24	24	13	21
31		--------	--------	183	--------	20	13	--------

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Daily discharge, in second-feet, of Fish Creek near Scofield, Utah, for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Apr.	May	June	July	Aug.	Sept.
1919–20								
1	22	16		221	664	63	27	26
2	22	16		241	597	61	27	26
3	21	16		258	555	59	26	26
4	20	16		233	514	58	26	26
5	20	16		226	472	54	26	25
6	18			211	431	52	26	26
7	19			218	407	47	25	24
8	18			257	385	43	25	24
9	17			280	368	37	30	24
10	17			330	329	36	27	24
11	17			318	290	37	24	22
12	17			284	269	36	24	21
13	17			286	235	33	24	22
14	16			287	208	31	23	22
15	18			294	194	30	22	22
16	17			336	177	31	21	21
17	16			291	162	30	21	22
18	16			446	135	32	21	22
19	16			536	124	28	30	21
20	16				115	27	35	21
21	16				101	26	28	21
22	16				92	24	26	21
23	16				90	27	26	25
24	17				87	36	26	24
25	17		35	900	83	33	28	25
26	17					30	45	24
27	17					28	32	24
28	16				74	26	29	24
29	16		76			26	26	22
30	16		131	795		26	26	27
31	16			751		27	26	

NOTE.—No gage-height record Oct. 1–6, 21, 1918, June 22–28, 1919, May 20–29, June 3–5, 26–30, July 1, and Aug. 28, 1920; discharge estimated or interpolated. Only partial records secured during winter, and these were insufficient for determination of discharge, except Oct. 27–31, 1918, discharge for which was estimated at 20 second-feet.

Monthly discharge of Fish Creek near Scofield, Utah, for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	45		26.2	1,610
April	335	83	163	9,700
May	474	178	344	21,200
June	153	24	63.1	3,750
July	29	16	18.7	1,150
August	26	13	16.4	1,010
September	28	13	17.5	1,040
1919–20				
October	22	16	17.4	1,070
May		211	519	31,900
June	664		248	14,800
July	63	24	36.6	2,250
August	45	21	26.7	1,640
September	27	21	23.5	1,400

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HUNTINGTON CREEK NEAR HUNTINGTON, UTAH

LOCATION.—In SE. ¼ sec. 6, T. 17 S., R. 8 E., at Cunha ranch, 7 miles northwest of Huntington, Emery County. Below all main tributaries except Fish Creek.

DRAINAGE AREA.—188 square miles (measured on United States Forest Service map, 1920).

RECORDS AVAILABLE.—May 3, 1909, to September 30, 1920, fragmentary.

GAGE.—Stevens continuous water-stage recorder on right bank installed September 11, 1917; inspected by Joseph Cunha. For gages used prior to September 11, 1917, see Water-Supply Paper 479.

DISCHARGE MEASUREMENTS.—Made by wading or from bridge at gage.

CHANNEL AND CONTROL.—Bed composed of coarse gravel; shifts occasionally during high stages. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 4.86 feet at 11.30 p. m. May 2 (discharge, 790 second-feet). Minimum stage recorded, 2.40 feet September 17 (discharge, 15 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 5.33 feet at 9.30 p. m. May 25 (discharge, 1,340 second-feet). Minimum discharge not determined.

1909–1920: Maximum discharge recorded, 1,340 second-feet at 9.30 p. m. May 25, 1920. Minimum discharge recorded, 12 second-feet March 20–23, 1912.

ICE.—Stage-discharge relation seriously affected by ice every winter.

DIVERSIONS.—Several small ditches divert from tributaries above station.

REGULATION.—A small storage reservoir on Huntington Creek above station controls distribution of flow to a slight extent.

ACCURACY.—Stage-discharge relation changed during summer of 1919 when no record was obtained, and again during high water, May 16–19, 1920; affected by ice each winter. Rating curves well defined below 400 second-feet and extended above, guided by high-water curves developed for 1909 and 1922. Operation of water-stage recorder satisfactory only during periods for which daily discharge is given continuously in table. During other periods of record given outside staff gage was read to hundredths about once a week. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph except May 16–19, 1920, when shifting-control method was used. Discharge interpolated or estimated November 4–9, 1918, April 1, 2, 24–27, and June 2–3, 5, 17–21, 1920. Monthly values estimated from fragmentary record October, 1918, and April and May, 1919. Records good.

Discharge measurements of Huntington Creek near Huntington, Utah, during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1918		*Feet*	*Sec.-ft.*	1919		*Feet*	*Sec.-ft.*
Oct. 20	J. W. Bones	2.68	43.0	Sept. 1	W. E. Dickinson	2.78	42.8
1919				1	do	3.44	153
Jan. 20	L. W. Jordan	* 2.60	31.8	6	do	2.73	36.8
Apr. 5	do	2.89	69	1920			
27	do	3.76	258	Mar. 1	do	2.73	36.3
May 31	J. W. Bones	3.92	312	May 13	do	3.94	293
				June 14	do	3.60	368

* Stage-discharge relation slightly affected by ice.

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Daily discharge, in second-feet, of Huntington Creek near Huntington, Utah, for the years ending Sept. 30, 1919 and 1920

Day.	Oct.	Nov.	Jan.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19										
1		55				545	270			75
2		49				570	229			
3		45				600				
4						582				
5					76	570				
6		48			67	505				37
7	51				60	496				31
8					57	495				33
9					53	470				49
10		52			49	465				38
11		53			53	404				33
12		55			46	430				32
13	40	56			43	465				33
14		57			41	505	140			27
15		56			46	530				21
16		49			50	570				17
17	57	41			53	560				15
18		46			69	545				
19		42				530				
20	43	40		35		530				
21		24								
22										
23										
24						445				
25										
26										
27					258					
28					246					
29					340		111			
30			32		480					
31	45			45		277				
1919–20										
1				36	25	84	842			
2					26	110	700			
3		35			27	101	690		164	
4					28	110	674	164		
5	81				35	108	700			
6					42	119	740			62
7					47	153	896			
8					48	200	788			
9					47	268	674			
10	23	36			49	265	562		137	
11					44	217	499			
12					41	268	473			38
13					42	294	423			
14					49	262	392	169		
15					49	315	377			
16		28			48	420	349		65	
17					44	560	340			
18					36	720	330	159		
19					41	850	320			
20	24				40	986	310			
21					41	998	300			36
22					40	1,150	290			
23					40	1,080	254			
24					41	1,080	251			
25		31			42	1,080	247			
26	28				44	998	239		116	
27					46	976	251	141		
28					47	980	226			
29					56	962	220		36	
30		32			63	980	205			34
31						966				

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Monthly discharge of Huntington Creek near Huntington, Utah, for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October			[a] 45	[a] 2,800
November 1-21	57	24	48.0	2,000
April	480		[a] 150	[a] 9,000
May	600		[a] 475	[a] 29,000
1920				
April	63	25	42.3	2,520
May	1,150	84	569	35,000
June	896	205	452	26,900
The period				64,400

[a] Estimated.

HUNTINGTON CREEK NEAR CASTLEDALE, UTAH

LOCATION.—In sec. 33, T. 18 S., R. 9 E., half a mile below bridge on road from Castledale to Green River, 5 miles above mouth of Cottonwood Creek, and 6 miles east of Castledale, Emery County.

DRAINAGE AREA.—325 square miles (measured on topographic map).

RECORDS AVAILABLE.—May 12, 1911, to September 30, 1920, fragmentary.

GAGE.—Stevens continuous water-stage recorder on right bank; installed May 2, 1913, at same datum as vertical staff gage which it replaced; inspected by Rex Peterson.

DISCHARGE MEASUREMENTS.—Made by wading or from cable just below gage.

CHANNEL AND CONTROL.—Bed composed of sand and small gravel. Banks fairly high; subject to erosion but not to overflow. Original artificial control which was formed by 2 by 12-inch planks, placed edgewise in a trench and anchored to pipes driven into stream bed, has been obliterated.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 5.60 feet at 6 a. m. May 3 (discharge, 563 second-feet). Minimum stage recorded, 1.20 feet on August 20 (discharge, 6 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 7.60 feet at 7 a. m. May 23 (discharge, 1,040 second-feet). Minimum stage recorded, 1.74 feet on September 18 and 21. (discharge 10 second-feet).

1911-1920: Maximum stage recorded, 11.3 feet, September 8, 1913, when dam above station broke (discharge estimated, 1,750 second-feet). Minimum stage recorded, 0.95 foot, September 10, 1915, (discharge, 2.5 second-feet).

ICE.—Stage-discharge relation seriously affected by ice each winter.

DIVERSIONS.—The station is below all diversions in Castle Valley.

REGULATION.—Flow affected by irrigation in Huntington district.

ACCURACY.—Stage-discharge relation changed during high water on May 3, 1919, and May 23, 1920; affected by ice each winter. Rating curves fairly well defined below 300 second-feet, and extended above parallel to 1914 curve. Operation of water-stage recorder not satisfactory owing to silting up of stilling well during frequent periods in 1919, and June 16-20, 1920. No record obtained during winter. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Discharge interpolated or estimated for a few short periods of no gage-height record. Records good.

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Discharge measurements of Huntington Creek near Castledale, Utah, during the year ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1918		*Feet*	*Sec.-ft.*	1919		*Feet*	*Sec.-ft.*
Oct. 19	J. W. Bones	1.85	22.8	Sept. 6	W. E. Dickinson	1.77	16.2
1919				1920			
Jan. 30	L. W. Jordan	*4.30	20.6	Mar. 2	do	*4.01	58
Apr. 5	do	2.80	67	May 15	do	3.46	125
Apr. 27	do	4.13	264	June 13	do	3.63	145
May 31	J. W. Bones	3.33	105				

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Huntington Creek near Castledale, Utah, for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Jan.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918-19										
1						352	56	15	11	
2		26			70	388		15	48	
3						442	40	14	31	
4						368		13	21	
5					69	339		13		
6						263	23	14	20	16
7						213	22	14		
8						202	21	13		
9		21			60	174	22	13	19	
10						169		12	16	
11						115	19	12	12	
12					49	120		12	10	
13	22				45	137	16	12		
14					43	176	19	12		
15					42	192	19	31		
16		24			42	231	18	26	8	
17					42	221	16	14		
18					60	227	17	13		
19	23				85	202		13	6	
20	23				112	194	16	12	6	
21					171	192		11	7	
22					227	206	15	11	7	
23					269	194	16	11	7	
24					266	154	17	11	7	
25					306	151	17	11	7	
26					306	169	17	11	7	
27					254	192	15	11	8	
28					229	126	14	11	8	
29					225	106	15	11	8	
30			30		229	118	16	11	8	
31	27			74		96		11	8	

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Daily discharge, in second-feet, of Huntington Creek near Castledale, Utah, for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Jan.	Mar.	Apr.	May	June	July	Aug.	Sept.
1920										
1				60	29	39	515	34	18	11
2				58	33	38	483	30	18	12
3					33	45	318	28	27	11
4					33	44	297	28	36	11
5				52	36	44	284	27	24	11
6					33	65	374	26	22	12
7				47	38	46	518	27	21	12
8				44	42	71	466	25	21	12
9				45	41	86	359	24	22	14
10				45	44	108	249	22	22	14
11				44	47	76	148	21	20	14
12				42	40	54	138	20	18	12
13				43	38	76	121	19	18	12
14				42	36	102	100	19	16	12
15				38	34	98	80	19	16	11
16				39	35	165		18	16	11
17				36	36	249		18	16	10
18				34	33	370	50	18	16	11
19				35	34	522		18	22	11
20				36	36	669		18	60	11
21				38	36	769	36	18	21	10
22				38	33	706	36	17	15	11
23				36	33	639	35	29	15	11
24				40	40	753	32	22	15	11
25				40	41	784	25	22	60	12
26				36	38	671	30	22	85	12
27				33	33	630	40	20	50	12
28				31	33	584	39	19	33	12
29				31	34	676	36	24	21	11
30				29	26	653	37	20	15	12
31				28		664		18	13	

Monthly discharge of Huntington Creek near Castledale, Utah, for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
April	306	42	126	7,500
May	443	96	207	12,700
June	56	14	21.9	1,300
July	31	11	13.4	824
August	48	6	12.6	775
The period				23,100
1920				
March	60	28	41.2	2,530
April	47	29	36.3	2,160
May	839	38	344	21,200
June	515	25	166	9,880
July	34	17	22.0	1,350
August	85	13	26.2	1,610
September	14	10	11.6	690
The period				39,400

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SAN RAFAEL RIVER NEAR GREEN RIVER, UTAH

LOCATION.—In sec. 27, T. 22 S., R. 14 E., at county bridge near Tomlinson ranch, on road from Green River to Hanksville, 16 miles southwest of Green River, Emery County.

DRAINAGE AREA.—1,690 square miles (measured on topographic map).

RECORDS AVAILABLE.—May 5, 1909, to October 17, 1920, when station was discontinued.

GAGE.—Steel tape gage on downstream side of bridge, installed September 10, 1919. Prior to that date vertical staff on downstream side of right abutment of bridge. Datum of vertical staff was 6.18 feet higher than datum of tape gage. Read by W. E. Watson and P. F. Herron.

DISCHARGE MEASUREMENTS.—Made from highway bridge at gage or by wading.

CHANNEL AND CONTROL.—Bed composed of mud and quicksand; shifting. Control not well defined. Banks fairly high but left bank subject to overflow during extreme floods.

EXTREMES OF DISCHARGE.—Not determined for 1919 and 1920.

1909–1918: Maximum stage recorded, 12.6 feet October 8, 1916 (discharge, 7,300 second-feet); water standing in pools during August and September, 1910, and August 13 to September 8, 1915.

ICE.—Stage-discharge relation seriously affected by ice.

DIVERSIONS.—Below practically all diversions from San Rafael River. The main diversions in basin are made from the tributaries, for irrigation in Castle Valley.

REGULATION.—None.

ACCURACY.—Discharge measurements obtained are insufficient to determine a rating as stage-discharge relation is frequently changed by shifting sand and by driftwood lodging against pile bents of bridge. The only reliable gage-height records obtained during this period were readings of tape gage September 10, 1919, to July 10, 1920.

Discharge measurements of San Rafael River near Green River, Utah, during the period, Oct. 1, 1918, to Oct. 17, 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-feet*			*Feet*	*Sec.-feet*
1918				1919			
Oct. 23	J. W. Bones	3.74	324	Sept. 10	W. E. Dickinson	[b] 10.10	112
1919				1920			
Jan. 28	L. W. Jordan	[a] 4.58	40.6	Feb. 29	do	9.35	163
Apr. 3	do	3.86	192	June 11	do	12.85	1,680
May 5	do	6.20	1,170	Oct. 17	A. B. Purton	8.87	36.4
June 1	J. W. Bones	5.58	980				

[a] Stage-discharge relation affected by ice.
[b] Datum lowered 6.18 feet. This and subsequent measurements referred to tape gage installed Sept. 10, 1919.

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Daily gage-height, in feet, of San Rafael River near Green River, Utah, for the period Sept. 10, 1919, to July 10, 1920

Day	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Apr.	May	June	July
1	--------	9.57	9.57	9.36	10.71	11.16	--------	9.34	14.16	10.28
2	--------	9.56	9.66	9.50	10.72	11.15	--------	9.48	13.48	10.23
3	--------	9.51	9.62	9.60	10.70	11.00	--------	9.56	12.98	10.19
4	--------	9.50	9.64	10.07	10.72	11.20	8.50	9.65	12.92	9.80
5	--------	9.46	9.62	10.06	10.75	11.29	8.62	9.30	12.86	9.77
6	--------	9.42	9.79	10.00	10.73	11.16	8.70	9.31	12.90	9.61
7	--------	9.42	9.66	9.94	10.80	11.18	8.50	9.48	13.04	9.55
8	--------	9.41	9.72	9.99	10.81	11.10	9.14	9.62	13.28	9.42
9	--------	9.46	9.73	9.54	10.85	11.00	9.48	9.76	13.12	9.29
10	10.04	9.47	9.72	9.85	10.87	11.01	9.48	9.90	12.98	9.08
11	9.56	9.44	9.70	9.80	10.87	11.02	9.46	9.94	12.60	--------
12	9.51	9.45	9.75	9.70	10.80	10.90	9.48	9.74	11.96	--------
13	9.47	9.47	9.86	9.68	10.80	10.92	9.56	9.72	11.94	--------
14	13.51	9.45	9.86	9.68	10.86	10.90	9.77	9.88	11.76	--------
15	10.01	9.49	9.65	9.69	10.88	10.60	9.52	9.90	11.44	--------
16	11.11	9.50	9.66	9.82	10.92	10.70	9.47	9.92	11.22	--------
17	10.06	9.55	9.70	9.94	10.96	10.70	9.50	10.02	11.15	--------
18	10.02	9.57	9.75	10.05	10.98	9.64	9.48	10.68	10.98	--------
19	10.11	9.51	9.71	10.00	10.97	9.66	9.48	11.70	10.90	--------
20	10.07	9.59	9.65	10.01	10.99	9.70	9.32	12.26	10.80	--------
21	9.82	9.57	9.85	10.10	11.01	9.70	9.30	12.92	10.78	--------
22	9.54	9.56	9.82	10.12	11.00	9.80	9.30	13.16	10.64	--------
23	9.47	9.55	9.84	10.06	11.03	9.82	9.30	13.34	10.56	--------
24	9.41	9.57	9.80	10.30	11.05	9.85	9.28	13.40	10.50	--------
25	9.33	9.62	9.71	10.34	11.15	9.60	9.28	13.64	10.36	--------
26	9.41	9.64	9.69	10.52	11.12	9.62	9.27	13.43	10.38	--------
27	9.47	9.62	9.60	10.53	11.16	9.64	9.29	13.05	10.47	--------
28	9.81	9.58	9.56	10.55	11.16	9.70	9.28	12.62	10.73	--------
29	9.96	9.57	9.55	10.64	11.20	9.35	9.26	12.84	10.55	--------
30	9.82	9.58	9.41	10.66	11.18	--------	9.30	13.46	10.34	--------
31	--------	9.58	--------	10.69	11.16	--------	--------	14.00	--------	--------

COTTONWOOD CREEK NEAR ORANGEVILLE, UTAH

LOCATION.—In SW. ¼ sec. 9 or 10, T. 18 S., R. 7 E., at Robert Johnson's ranch, 5 miles northwest of Orangeville, Emery County.

DRAINAGE AREA.—200 square miles (measured on United States Forest Service map, 1920).

RECORDS AVAILABLE.—May 1, 1909, to September 30, 1920.

GAGE.—Inclined staff on left bank near ranch house and about 500 feet above cable; installed September 5, 1919. Prior to that date a vertical staff on left bank about 75 feet upstream was read. Gages read by Robert Johnson.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Bed rough; shifting. Banks fairly high but have been overflowed by the sudden floods, to which the stream is subject. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 5.8 feet in night of September 8 (discharge, 1,750 second-feet). Minimum discharge probably less than 15 second-feet in winter.

Maximum stage recorded during year ending September 30, 1920, 5.6 feet at 8 p. m. May 30 and 8 p. m. June 6 (discharge, 1,520 second-feet). Minimum stage recorded, 2.7 feet October 28 and March 16 (discharge, 8 second-feet).

1909–1920: Maximum discharge recorded, 1,980 second-feet, September 7, 1913; minimum discharge recorded, 5 second-feet, September 21, 1910.

ICE.—Stage-discharge relation affected by ice every winter.

DIVERSIONS.—Two or three small ditches divert water above station but main diversions are below.

REGULATION.—None.

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ACCURACY.—Stage-discharge relation changed September 5, 1919, when station was moved 75 feet downstream, and again during high water, May 30–31, 1920; affected by ice November 23, 1918, to March 31, 1919, and December 11, 1919, to January 23, 1920. Rating curves fairly well defined below 800 second-feet and extended above. Gage read to half-tenths four to six times a week. Daily discharge ascertained by applying daily gage height to rating rable and by interpolation for days when gage was not read, except for periods when stage-discharge relation was affected by ice. For these periods discharge was estimated from study of observer's notes, weather records, and discharge measurements. Records fair.

Discharge measurements of Cottonwood Creek near Orangeville, Utah, during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
1918				1919			
Oct. 18	J. W. Bones	4.16	33.3	Sept. 5	W. E. Dickinson	[b] 4.01	29.3
1919				1920			
Jan. 29	L. W. Jordan	[a] 5.22	18.1	Mar. 3	do	2.97	19.4
Apr. 4	do	4.34	43.8	May 14	do	3.86	189
27	do	5.19	207	June 12	do	4.77	755
May 30	J. W. Bones	6.04	541				

[a] Stage-discharge relation affected by ice.
[b] Reading on gage used until Sept. 5, 1919, gage used after Sept. 5, read 3.14 feet.

Daily discharge, in second-feet, of Cottonwood Creek near Orangeville, Utah, for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	56	32					38	310	420	92	58	39
2	58	32					38	380	360	88	54	130
3	54	32					39	480	340	84	50	50
4	49	32					42	525	340	80	49	39
5	58	28					42	570	340	77	34	39
6	55	33					42	440	320	74	34	39
7	52	23					42	440	300	70	34	30
8	49	24		15		15	39	490	290	70	34	30
9	44	24					36	460	280	67	34	500
10	39	25					38	440	280	64	30	30
11	36	27					39	430	270	64	36	28
12	34	28					42	420	260	64	34	26
13	34	28					46	440	245	64	34	80
14	33	29					49	615	230	64	34	160
15	32	30			15		30	730	220	64	33	335
16	39	29	15				38	760	210	64	33	34
17	46	32					46	800	200	61	32	34
18	34	34					65	850	190	58	32	34
19	34	32					84	920	175	55	30	26
20	38	29					100	825	160	52	29	26
21	36	25					120	875	145	49	29	26
22	36	25					175	860	140	49	29	26
23	33			18		26	230	790	130	49	29	26
24	32						245	775	139	46	29	26
25	30						345	790	129	46	29	26
26	29	20					280	800	115	46	29	26
27	30						206	875	110	44	28	26
28	32						190	730	110	42	28	26
29	29						210	465	100	42	28	26
30	30						245	543	100	42	28	26
31	32							480		42	26	

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Daily discharge, in second-feet, of Cottonwood Creek near Orangeville, Utah, for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919-20												
1	26	20	20		15	18	18	60	1,060	340	135	32
2	26	20	29		15	15	18	34	980	294	262	32
3	26	20	21		15	20	11	60	1,010	285	106	32
4	26	20	23		15	15	18	80	970	285	100	32
5	26	20	25		15	15	18	80	1,060	240	82	34
6	26	20	26		11	15	20	110	1,200	200	82	36
7	26	20	23		11	13	20	134	1,100	200	82	34
8	26	20	20		15	11	20	170	1,150	200	82	32
9	23	20	15		18	20	30	210	1,010	165	82	32
10	20	20			15	15	28	243	810	165	76	32
11	20	20			11	18	26	105	775	141	73	32
12	22	20			13	13	20	243	775	141	73	32
13	23	20		19	15	15	23	208	700	135	70	29
14	26	20			13	14	26	196	630	135	66	27
15	26	20			13	13	20	167	630	122	66	28
16	23	20			13	8	26	208	630	115	66	30
17	23	20			18	11	15	243	630	115	66	31
18	22	20			15	15	15	360	595	115	82	32
19	21	20			16	15	11	519	560	110	182	31
20	20	20	15		15	15	20	780	560	110	70	30
21	22	18			18	18	15	820	508	106	47	28
22	23	15			18	20	15	960	495	100	36	27
23	24	16			18	19	20	950	465	110	36	26
24	26	18		11	15	18	15	950	424	110	36	24
25	26	20		13	13	15	15	1,050	408	100	66	23
26	20	20		15	15	18	18	1,000	408	94	49	23
27	15	20		13	20	11	20	1,050	465	90	42	23
28	8	20		13	20	11	18	1,100	380	94	38	25
29	14	20		13	19	15	20	1,150	380	90	36	27
30	20	20		15	------	15	40	1,250	330	100	36	27
31	20	------		15	------	18	------	1,250	------	90	32	------

Monthly discharge of Cottonwood Creek near Orangeville, Utah, for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	58	29	39.4	2,420
November	34	----------	26.1	1,550
December	----------	----------	15	922
January	----------	----------	16.5	1,010
February	----------	----------	15	833
March	----------	----------	20	1,240
April	245	30	101	6,010
May	900	310	626	38,500
June	420	100	221	13,200
July	92	42	60.4	3,710
August	84	28	35.9	2,210
September	500	26	62.3	3,710
The year	960	----------	104	75,300
1919-20				
October	26	8	22.4	1,380
November	20	15	19.6	1,170
December	29	----------	16.9	1,040
January	15	----------	10.9	670
February	20	11	15.2	874
March	20	8	15.2	935
April	40	11	20.0	1,190
May	1,260	34	507	31,200
June	1,200	330	708	41,800
July	340	90	152	9,350
August	262	32	76.0	4,670
September	30	23	29.4	1,780
The year	1,250	----------	132	96,000

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FERRON CREEK (UPPER STATION) NEAR FERRON, UTAH

LOCATION.—In SW. ¼ sec. 1, T. 20 S., R. 6 E., a quarter of a mile below house at Peterson ranch, 1½ miles above gristmill, and 5 miles northwest of Ferron, Emery County.

DRAINAGE AREA.—140 square miles (measured on United States Forest Service map, 1920).

RECORDS AVAILABLE.—May 6, 1911, to September 30, 1920.

GAGE.—Inclined staff on right bank; installed September 13, 1911, to replace the original vertical staff 165 feet upstream. Datum lowered 1.00 foot September 4, 1919. Read by Joseph Peterson.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 15 feet upstream from gage.

CHANNEL AND CONTROL.—Banks high and not subject to overflow. Bed composed of sand and gravel; shifting. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 6.8 feet at 6.15 p. m. August 2 (discharge from extended rating curve, 900 second-feet); minimum discharge occurred during ice period and was less than 5 second-feet.

Maximum stage recorded during year ending September 30, 1920, 10.0 feet at 3 p. m. July 25 (discharge probably 2,000 second-feet). Minimum discharge probably occurred during ice period and may have been practically zero on a number of cold mornings.

1911–1920: Maximum stage recorded, 10.0 feet at 3 p. m. July 25, 1920 (discharge probably 2,000 second-feet). Minimum discharge recorded, 1 second-foot, March 22 and 23, 1912.

ICE.—Stage-discharge relation seriously affected by ice every winter.

DIVERSIONS.—Above all diversions except a small ditch for the Peterson ranch.

REGULATION.—None.

ACCURACY.—Stage-discharge relation for low stages changed during high water April 20, 1919, and about April 1, 1920; affected by ice November 23, 1918, to March 25, 1919, October 28, 1919, and November 28, 1919, to March 11, 1920. Rating curves well defined between 12 and 400 second-feet. Gage read to hundredths once a day except July 14, 24, September 1–3, 15, 16, and 18, 1919, when it was not read, November 16, 1919, to March 22, 1920, when it was read two or three times a week, and May and June, 1920, when it was read twice a day. Daily discharge ascertained by applying daily gage height to rating table except for periods when stage-discharge relation was affected by ice. For these periods discharge was estimated from meter measurements, study of observer's notes, recorded gage heights, and weather records. Discharge interpolated for days when gage was not read. Records good.

Discharge measurements of Ferron Creek (upper station) near Ferron, Utah, during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1918		*Feet*	*Sec.-ft.*	1919		*Feet*	*Sec.-ft.*
Oct. 18	J. W. Bones	0.70	17.3	Sept. 4	W. E. Dickinson	[b] 1.56	22.6
19	do	.66	14.6				
1919				1920			
				Mar. 4	do	1.21	6.1
Jan. 29	L. W. Jordan	[a] 1.75	9.5	May 14	do	2.86	160
Apr. 4	do	.88	30.0	June 12	do	3.70	299
26	do	1.95	153				

[a] Stage-discharge relation affected by ice.
[b] Gage datum lowered 1.00 foot prior to this measurement.

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Daily discharge, in second-feet, of Ferron Creek (upper station) near Ferron, Utah, for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	12	12					24	196	220	54	40	35
2	14	12					20	268	204	57	160	75
3	14	8					39	246	188	50	50	30
4	43	8					28	425	173	50	43	23
5	28	13					33	309	173	50	40	20
6	20	6				6	31	220	166	50	37	20
7	19	8					24	212	166	50	37	20
8	17	8					20	237	159	43	40	19
9	28	12					12	220	145	40	100	18
10	18	12					47	204	138	40	37	15
11	16	12		6			88	159	132	50	34	15
12	14	12				5	31	173	126	40	31	15
13	13	12					24	263	119	40	28	15
14	13	12					30	328	119	38	25	18
15	13	11			8	6	12	328	115	37	25	50
16	17	11	7				88	328	113	40	25	25
17	16	10					126	300	107	65	25	20
18	17	12				5	82	526	101	37	22	30
19	15	12					66	589	95	37	20	25
20	14	11				6	203	366	90	31	22	18
21	18	5					107	435	84	31	20	14
22	14	5		5			173	505	79	34	22	15
23	14			6		8	138	366	74	31	20	15
24	13			8		9	145	347	74	32	20	15
25	11			8		10	173	328	70	34	20	15
26	8	5				12	159	425	65	31	19	16
27	12					12	138	425	61	31	20	18
28	11			8		24	113	328	57	31	20	20
29	8				-------	17	119	356	55	37	19	18
30	11				-------	17	159	328	50	37	20	18
31	13	-------			-------	31	-------	246	-------	50	20	-------
1919–20												
1	18	11					13	60	486	111	39	22
2	18	15				8	10	62	550	102	36	22
3	15	13					10	72	550	102	36	22
4	15	12				6	6	113	550	91	36	22
5	15	13					16	161	511	81	42	22
6	14	10					20	168	589	72	86	25
7	14	8					123	204	521	64	41	24
8	14	8				12	90	161	576	64	41	22
9	13	14					64	148	511	56	39	22
10	10	13					36	178	491	60	36	22
11	10	8					38	111	393	50	36	21
12	15	13				15	25	111	300	48	33	22
13	15	5				16	56	123	330	46	30	20
14	13	11				13	48	161	314	44	30	20
15	18	8			9	18	39	135	286	40	30	20
16	11	9	10	7		14	30	158	277	42	29	20
17	11	11				11	22	364	228	92	30	113
18	15	13				14	30	330	255	39	49	22
19	10	12				15	12	456	275	36	30	20
20	6	11				16	31	726	220	32	42	20
21	8	11				16	12	424	207	30	30	20
22	10	11				15	11	474	196	42	30	18
23	10	11				13	28	670	161	36	29	18
24	12	15				12	28	602	161	36	29	17
25	8	20				11	17	589	154	500	48	16
26	6					11	20	550	158	86	30	16
27	10					10	30	611	151	36	33	15
28	10	18				8	60	542	125	42	28	16
29	15					10	46	498	118	35	27	16
30	11				-------	11	52	900	111	41	27	16
31	13	-------			-------	13	-------	582	-------	39	24	-------

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Monthly discharge of Ferron Creek (upper station) near Ferron, Utah, for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	43	8	15.9	978
November	13		8.80	524
December			7.00	430
January			6.48	398
February			8.00	444
March	31		8.71	536
April	203	12	81.7	4,860
May	589	159	322	19,800
June	220	50	117	6,960
July	65	31	41.2	2,530
August	160	19	34.2	2,100
September	75	14	22.3	1,330
The year	589		56.5	40,900
1919–20				
October	18	6	12.4	762
November	20	5	12.5	744
December			10	615
January			7	430
February			9	518
March	18		12.1	744
April	123	6	34.1	2,030
May	900	60	335	20,600
June	589	111	325	19,300
July	500	30	70.8	4,350
August	86	24	35.7	2,200
September	113	15	23.0	1,370
The year	900		74.2	53,700

LITTLE COLORADO RIVER BASIN

LITTLE COLORADO RIVER NEAR WOODRUFF, ARIZ.

LOCATION.—In T. 16 N., R. 22 E., at highway bridge 1½ miles below Woodruff, Navajo County, and 4 miles below Silver Creek.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 5, 1915, to December 31, 1919, when station was discontinued.

GAGE.—Stevens continuous water-stage recorder on right bank just below highway bridge.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading near bridge.

CHANNEL AND CONTROL.—Bed consists of bedrock covered with thin deposit of sand and silt; shifts considerably because of large quantities of silt that are constantly being deposited at low stages and scoured out at each rise. No well-defined control. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, 5.58 feet at 1 a. m. July 19 (discharge, 5,000 second-feet); minimum discharge, dry, June 10–13, 16, 25.

Maximum stage during period October 1, 1919, to December 31, 1919, 12.0 feet at 11 a. m. December 5 (discharge, 25,000 second-feet); minimum discharge, 10 second-feet November 7–8.

1915–1919 (December 31): Maximum stage 12.7 feet January 19, 1916, (discharge not determined). Stream dry for about two weeks during June and July, 1916, and June 10–13, 16, 25, 1919.

ICE.—Stage-discharge relation not seriously affected by ice.

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Diversions.—Much of the low-water flow is diverted for irrigation in vicinity of St. Johns and Snowflake; amount unknown.

Regulation.—There are several small reservoirs in headwaters of this stream and in Silver Creek which regulate the flow to some extent.

Accuracy.—Stage-discharge relation changed during flood of December 5, 1919. Rating curve used to December 5, 1919, fairly well defined below 1,000 second-feet and extended above. Curve used December 6–31, 1919, based on one discharge measurement. Operation of water-stage recorder fairly satisfactory, except as noted in footnote to daily-discharge table. Daily discharge determined by applying mean daily gage height to rating table or by hourly discharge. Records fair.

Discharge measurements of Little Colorado River at Woodruff, Ariz., during the years ending Sept. 30, 1919 and 1920

[Made by J. F. Kunesh]

Date	Gage height	Discharge	Date	Gage height	Discharge
1918	*Feet*	*Sec.-ft.*	1919	*Feet*	*Sec.-ft.*
Dec. 15	1.04	12	May 8	0.92	11
			8	.91	11
1919			June 10	.40	.04
Jan. 27	* 1.96	16	July 12	2.07	290
Mar. 23	3.12	1,020	Aug. 24	1.49	98
24	2.82	743	Sept. 29	1.82	164
Apr. 10	2.30	395	Dec. 20	.72	106

*Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Little Colorado River near Woodruff, Ariz., for the period Dec. 15, 1918, to Dec. 31, 1919

Day	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19										
1				19	708	124	0.8	0.9	560	19
2				23	560	100	1	15	810	19
3				19	533	96	2	11	810	19
4				30	526	100	2	40	640	19
5			16	33	576	48	2	190	595	19
6				28	546	33	1	420	550	55
7		14		21	600	22	1	624	505	181
8				19	414	11	.9	1,530	460	431
9			59	21	370	8	.7	455	415	112
10			110	19	403	5	0	576	370	190
11			290	28	437	4	0	280	325	70
12			375	30	386	3	0	264	328	112
13			325	30	335	2	0	732	321	403
14			110	234	307	1	.1	1,590	319	640
15	12		100	234	284	.7	.2	1,590	317	302
16			76	159	268	.2	0	1,900	315	241
17			119	194	268	.2	.3	2,650	313	190
18			100	159	284	1	.6	1,650	311	148
19			76	1,010	280	1	.6	1,900	309	294
20		16	62	1,530	268	2	.4	1,900	307	560
21			33	1,590	272	3	.4	1,330	241	190
22			45	1,770	272	2	.4	1,270	175	112
23	12		42	1,010	280	3	.6	768	136	65
24			106	742	289	14	.2	526	102	64
25			76	594	264	8	0	462	96	45
26			22	402	241	5	.8	420	83	34
27		16	30	553	227	5	.2	375	69	241
28			30	848	227	6	.6	350	67	260
29		16	-------	802	245	22	.4	698	85	172
30			-------	802	170	6	.3	375	52	107
31	*		-------	810	-------	1	-------	302	45	-------

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Daily discharge, in second-feet, of Little Colorado River near Woodruff, Ariz., for the period Dec. 15, 1918, to Dec. 31, 1919—Continued

Day	Oct.	Nov.	Dec.	Day	Oct.	Nov.	Dec.	Day	Oct.	Nov.	Dec.
1919				1919				1919			
1	79	19	170	11	34	17	185	21	23	32	113
2	65	17	162	12	34	19	171	22	24	32	104
3	52	18	170	13	30	19	171	23	26	28	100
4	45	17	153	14	30	18	170	24	28	27	97
5	45	15	6,490	15	33	16	182	25	28	28	93
6	40	13	868	16	30	17	157	26	28	28	87
7	42	10	483	17	29	17	147	27	27	257	85
8	42	10	335	18	28	19	136	28	28	991	72
8	36	13	255	19	24	22	139	29	26	280	70
10	36	15	196	20	24	29	134	30	22	148	81
								31	21		78

NOTE.—No record Oct. 1 to Dec. 14, 1918, owing to lack of attention to recorder. Discharge estimated because of ice, Dec. 16, 1918, to Jan. 12, 1919, Jan. 13–26, and Jan. 28 to Feb. 8, 1919. No gage record and discharge interpolated Aug. 5–10 and 12–19, 1919. Staff gage readings used to compute daily discharge Dec. 21–31, 1919. Braced figures show estimated mean discharge for periods indicated.

Monthly discharge of Little Colorado River near Woodruff, Ariz., for the period Dec. 15, 1918, to Dec. 31, 1919

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
December 15–31			12.0	405
January			15.2	935
February	375		82.3	4,570
March	1,770	19	444	27,300
April	708	170	361	21,500
May	124	.2	20.6	1,270
June	2	0	.6	36
July	2,650	.9	810	49,800
August	810	45	323	19,900
September	640	19	177	10,500
The period				136,000
1919				
October	79	21	34.2	2,100
November	991	10	73.0	4,340
December	6,490	70	382	23,500
The period				29,900

ZUNI RIVER AT BLACK ROCK, N. MEX.

LOCATION.—At reservoir of Zuni Indian Reservation at Black Rock, McKinley County. Rio de Los Nutrias, nearest large tributary, enters from north 4 miles above.

DRAINAGE AREA.—About 660 square miles.

RECORDS AVAILABLE.—Yearly flow July 1, 1903, to June 30, 1905; July 1, 1908, to June 30, 1910. Monthly flow October 1, 1910, to September 30, 1920. Record since July 1, 1908, shows inflow into reservoir.

METHOD OF COLLECTING DATA.—From July 1, 1903, to June 30, 1905, records were obtained by the ordinary stream-gaging methods. Reservoir completed in 1908. Record beginning July 1, 1908, obtained by means of gage in reservoir and capacity curve for reservoir, quantity of water released from the reservoir during the periods of inflow being taken into consideration.

FLOODS.—Channel dry greater part of year below point where it leaves mountains, but stream is subject to sudden floods of considerable volume and usually of short duration.

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DIVERSIONS.—Reservoir at Ramah, about 18 miles above station, capacity of which is given as 4,240 acre-feet, is used to irrigate about 1,150 acres in T. 11 N., R. 16 W. There are other small ponds or reservoirs in drainage area.

COOPERATION.—Record furnished by the United States Indian Service, through H. F. Robinson, supervising engineer, Albuquerque, N. Mex.

Monthly run-off of Zuni River at Black Rock, N. Mex., for the years ending Sept. 30, 1919 and 1920

Month	Run-off in acre-feet	Month	Run-off in acre-feet
1918-19		1919-20	
October	540	October	386
November	35	November	0
December	100	December	996
January	40	January	2,600
February	140	February	2,750
March	6,060	March	460
April	1,040	April	1,510
May	0	May	0
June	0	June	980
July	22,400	July	342
August	14,700	August	630
September	697	September	372
The year	45,700	The year	11,000

CHEVLON[1] FORK NEAR WINSLOW, ARIZ.

LOCATION.—In T. 18 N., R. 17 E., 300 yards below highway bridge, 1 mile above concrete diversion dam, 1½ miles above junction with Little Colorado River, and 14 miles southeast of Winslow, Navajo County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 18, 1905, to December 12, 1908; December 18, 1915, to December 31, 1919, when station was discontinued.

GAGE.—Stevens water-stage recorder attached to rock ledge on right bank 300 yards below highway bridge.

DISCHARGE MEASUREMENTS.—Made from cable 300 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed consists of sand and gravel; shifting during floods. No well-defined control. Station in box canyon which ends just above cable.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, 5.37 feet at 6 p. m., April 1 (discharge, 1,110 second-feet); minimum discharge, 2 second-feet at various periods throughout year.

Maximum stage for period October 1, 1919, to December 31, 1919, 12.9 feet at noon, December 5 (discharge, estimated 10,000 second-feet); minimum discharge, 3 second-feet October 19–24.

1916–1919 (December 31): Maximum stage, 13.2 feet at 9 a. m., January 19, 1916 (discharge not determined); minimum discharge nearly dry at midnight July 31, 1918.

ICE.—Stage-discharge relation not seriously affected by ice.

DIVERSIONS.—No data.

ACCURACY.—Stage-discharge relation not permanent; several rating curves used. Operation of water-stage recorder satisfactory except as shown in footnote to daily discharge table. Daily discharge ascertained by applying to rating table mean daily gage height, determined by inspecting gage-height graph, except when shifting-control method was used. Records fair except for extremely low and high stages and for periods estimated, for which they are poor.

[1] Called "Chevelon Fork" in previous reports.

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Discharge measurements of Chevlon Fork near Winslow, Ariz., during the period Oct. 1, 1918, to Dec. 31, 1919

[Made by J. P. Kunesh]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
1918	*Feet*	*Sec.-ft.*	1919	*Feet*	*Sec.-ft.*	1919	*Feet*	*Sec.-ft.*
Dec. 14	1.91	3.0	May 7	1.40	3.6	Aug. 24	1.39	6.6
1919			8	1.34	6.0	Sept. 29	1.23	4.0
Jan. 27	1.92	3.0	8	1.34	6.6	Dec. 19	2.70	51
Mar. 28	3.56	226	June 10	1.45	3.2			
Apr. 40	3.09	215	July 11	1.42	3.2			

Daily discharge, in second-feet, of Chevlon Fork near Winslow, Ariz., for the period Oct. 1, 1918, to Dec. 31, 1919

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	4	2	4	3	6	13	940			5	27	4
2	4	2	3	3	6	12	1,020			3	74	4
3	4	2	3	3	7	13	925			2	140	4
4	4	2	3	3	7	13	925	30		2	105	4
5	4	2	3	3	8	13	875		5	2	72	3
6	4	2	3	3	8	16	900			2	46	5
7	4	3	3	3	9	19	690	8		2	30	5
8	5	3	3	3	9	19	380	6		14	23	14
9	5	3	3	3	10	22	260	5		3	18	8
10	5	3	3	3	10	22	205	5	3	2	15	5
11	5	3	3	3	13	19	190	5	3	4	12	5
12	5	4	3	3	22	20	215	4	3	8	12	5
13	5	4	3	3	28	21	320		3	4	12	6
14	5	4	3	3	40	32	360		3	4	11	4
15	5	4	3	3	31	75	350		3	4	9	4
16	5	4	3	3	32	100	295		3	31	8	4
17	5	4	3	3	28	74	145		3	4	8	4
18	4	3	3	3	28	58	113		3	51	7	4
19	5	3	4	3	21	62	100		3	17	13	5
20	6	3	3	3	21	160	89		3	43	27	7
21	7	3	3	3	22	200	80		3	76	14	4
22	5	3	3	3	17	230	70	5	3	92	10	4
23	5	3	3	3	16	208	63		3	150	8	4
24	4	4	3	3	14	160			2	73	7	4
25	3	5	3	3	11	116			2	46	6	4
26	3	5	3	3	11	84	50		2	31	7	4
27	3	4	3	3	13	73			2	23	6	4
28	3	4	3	3	10	179			2	27	5	4
29	3	4	3	4	------	305			2	19	5	4
30	2	4	3	4	------	293			2	13	4	4
31	2	------	3	5	------	560	------		------	15	4	------

Day	Oct.	Nov.	Dec.	Day	Oct.	Nov.	Dec.	Day	Oct.	Nov.	Dec.
1919				1919				1919			
1	4	40	350	11	4	9		21	3	9	
2	4	29	230	12	5	9		22	3	8	
3	4	22	162	13	4	9		23	3	8	
4	4	18	162	14	4	9		24	3	8	
5	4	15	3,000	15	4	9	160	25	370	15	
6	4	13		16	4	8		26	1,100	62	30
7	4	11		17	4	8		27	550	1,460	
8	4	10	150	18	4	8		28	225	1,680	
9	4	10		19	3	8	51	29	113	680	
10	4	9		20	3	18	30	30	79	460	
								31	57	------	

NOTE.—No gage-height record, Nov. 2–16, 1918, Dec. 25, 1918, to Jan. 6, 1919, Jan. 8–26, 28–31, Feb. 2–9, 1919, discharge interpolated; discharge for Mar. 21–22 estimated. Braced figures show estimated mean daily discharge for periods indicated based on comparison with records on Little Colorado River near Woodruff.

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Monthly discharge of Chevlon Fork near Winslow, Ariz., for the period Oct. 1, 1918, to Dec. 31, 1919

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	7	2	4.3	264
November	5	2	3.3	196
December	4	3	3.1	191
January	5	3	3.1	191
February	40	6	16.4	911
March	560	12	104	6,390
April	1,020	----------	326	19,400
May	----------	----------	9.9	609
June	----------	2	3.4	202
July	150	2	25.0	1,540
August	140	4	24.1	1,480
September	14	3	4.8	286
The year	1,020	2	43.7	31,600
1919				
October	1,100	3	83.4	5,130
November	1,680	8	155	9,220
December	3,000	----------	202	12,400
The period	----------	----------	----------	26,800

VIRGIN RIVER BASIN

VIRGIN RIVER AT VIRGIN, UTAH

LOCATION.—In NW. ¼ sec. 27 or NE. ¼ sec. 28, T. 41 S., R. 12 W., a few hundred feet above point where river enters a steep, narrow gorge, and three-quarters of a mile west of Virgin, Washington County. Station replaces the one maintained prior to February, 1915, half a mile above Virgin and gives practically the same record of flow.

DRAINAGE AREA.—1,010 square miles (measured on topographic map).

RECORDS AVAILABLE.—April 18, 1909, to September 30, 1920.

GAGE.—Chain gage on the right bank near the lower end of sandstone bluff; installed February 1, 1915. Gage read by Lawrence Earl.

DISCHARGE MEASUREMENTS.—Made by wading below gage.

CHANNEL AND CONTROL.—Bed consists of sand and gravel. Right bank high; left bank low and is overflowed. One channel at all stages. Principal control is a gravel bar a short distance below gage; shifting.

EXTREMES OF DISCHARGE.—Not determined for current years.

1909-1918: Maximum stage recorded, 11.6 feet at upper station October 27, 1912 (discharge estimated, 12,000 second-feet). The flood of August 31, 1909, probably equalled or exceeded this flow. Mininum discharge, 24 second-feet, July 1, 2, 4, and 5, 1909.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Above all important diversions.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed a number of times. Discharge measurements obtained are not sufficient to define a rating. Gage read to hundredths about four or five times a week. Daily discharge not determined. Occasional sharp floods of short duration occurred which do not appear in recorded gage heights.

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Discharge measurements of Virgin River at Virgin, Utah, during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
1918				1920			
Dec. 17	L. W. Jordan	2.24	140	Apr. 19	W. E. Dickinson	2.63	360
1919				Sept. 19	A. B. Purton	2.51	82
Mar. 16	A. B. Purton	2.16	137				
Aug. 17	do	2.01	71				

Daily gage height, in feet, of Virgin River at Virgin, Utah, for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1		2.28	2.34	2.20	2.38		2.62	2.72	2.26			2.04
2	2.14			2.18				2.44		2.18	3.64	
3		2.24			2.18		2.68	2.42		2.10		3.74
4	2.16	2.24	2.28	2.28	2.20	2.18	2.86	2.42	2.22		2.04	2.18
5	2.78		2.26	2.20		2.16		2.44	2.18			2.22
6		2.28			2.18	2.14				1.98	1.98	
7	2.28		3.80	2.22	2.16	2.20	2.46	2.44	2.14	2.00	1.94	
8	2.26	2.26	2.38	2.20			2.38		2.08	2.02	2.04	2.12
9		2.24				2.24	2.32	2.40		2.00		
10			2.10		2.18							2.02
11	2.26	2.24	2.08	2.22		2.20			2.12		2.00	
12	2.26	2.28		2.24	2.16	2.18	2.78	2.30			1.96	2.08
13	2.24		2.12		2.18			2.22	2.04		1.98	2.06
14		2.26		2.16	2.30	2.30	2.46		2.12			
15	2.30		2.12	2.20	2.20			2.18		3.48	2.02	2.00
16	2.28	2.32				2.16	2.42		2.04			
17		2.22	2.24		2.14	2.16	2.72	2.14		2.06	2.01	2.10
18	2.24	2.24		2.16				2.14	2.10		2.86	2.06
19			2.18		2.14	2.64	2.62	2.12	1.98			2.06
20	2.32	2.20		2.22		2.28			2.04		2.02	2.06
21	2.36		2.20		2.14	2.56	2.74				1.96	
22	2.32	2.26	2.20	2.20	2.12		2.62	2.26		2.08	1.98	2.04
23				2.20		2.32			2.00	2.80	1.98	2.06
24		2.40			2.14	2.36	2.44	2.28		2.22	1.98	
25		2.32	2.22	2.20	2.14			2.60	2.04	2.64		
26	2.24				2.24	2.72	2.58	2.38	1.94		2.16	2.08
27			2.32	2.20	2.22	2.52						2.12
28	2.62	2.36						2.26	1.94	2.46	1.98	
29		2.30		2.20			2.46			2.34		2.62
30	2.28	2.28	2.22	2.18				2.34	1.98		2.00	
31	2.26			2.22		2.52				2.12	2.68	
1919–20												
1	2.18	2.18	2.24	2.26		2.54	2.16	3.36		2.00	2.00	
2	2.16	2.18	2.38		2.62	4.80			2.84			
3			2.32				2.24		2.76	1.88	1.98	
4	2.12	2.24	2.46	2.50	2.40	2.24		3.34				2.52
5			3.14							1.92		
6	2.24	2.18	2.38	2.48	2.30		2.66	2.96			1.96	2.66
7		2.18	2.28		2.32		2.72	3.04	2.50			
8	2.18			2.26		2.26						
9			2.32			2.20			2.42	1.82	2.06	2.50
10	2.26	2.24		2.32	2.72		2.96	3.32	2.30	1.72		2.46
11	2.20	2.28	2.30		2.44	2.16	2.64			1.78	2.04	
12					2.34			2.94	2.18		2.02	2.44
13	2.16		2.30				2.72			1.82	2.00	
14		2.44		2.38	2.26			2.93	2.34			
15	2.16			2.32		2.10		2.88				
16	2.14	2.26	2.32		2.28		2.82	2.90	2.20	1.78	1.88	2.48
17			2.24	2.28	2.32	2.28				1.80		2.52
18	2.20	2.28				2.26		3.20	2.18	1.82		2.58
19	2.18		2.24	2.32			2.68		2.16		11.00	2.51
20			3.34		2.84	2.22		3.16		1.80		2.82
21	2.32		2.28	2.32	2.72		2.82		2.12			
22	2.24	2.24			3.36	2.32	2.52			1.78	2.74	2.48
23				2.32		2.86		3.16	2.12		2.66	
24		2.26	2.32	2.30				3.18		1.96		2.80
25	3.00				2.30	2.26						
26		3.44	2.32				2.62		2.14	1.94	2.84	2.54
27	2.24	2.26		2.32	2.16	2.48	2.60	2.86		1.92	2.60	
28			2.30		2.18	2.28			2.16			
29				2.30	2.18		2.90	2.82	2.22	1.90		
30	2.22		2.28	2.26							2.52	2.56
31	2.28		2.32			2.32		2.76		2.02	2.54	

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LEEDS (QUAIL) CREEK NEAR LEEDS, UTAH

LOCATION.—In N. ½ sec. 36, T. 40 S., R. 14 W., just above head of R. C. Savage's canal, a quarter of a mile above head of Leeds canal, three-quarters of a mile north of abandoned mining camp of Silver Reef, and 2½ miles north of Leeds, Washington County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 31, 1915, to September 30, 1920, when station was discontinued.

GAGE.—Vertical staff on left bank 60 feet above head of the Savage ditch, until July 11, 1919. Vertical staff on right bank 200 feet above head of Savage ditch installed August 17, 1919, at independent datum. Gages read by R. C. Savage.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed consists of gravel and boulders, shifting.

EXTREMES OF DISCHARGE.—Not determined.

ICE.—Stage-discharge relation slightly affected by ice.

DIVERSIONS.—Above all diversions. R. C. Savage diverts water a short distance below station for irrigation and domestic uses. Measurements of this ditch have shown from 1 to 4 second-feet. Measurements of Leeds canal which diverts a quarter of a mile below have shown discharge up to 18.5 second-feet.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent after February, 1920. Prior to that time, discharge measurements show changes too frequent to determine a rating. Rating curve based on discharge measurements made in 1920 and 1921, well defined between 4 and 20 second-feet and extended above and below. Gage read to hundredths at irregular intervals. Discharge determined only for days when gage was read. Records as given are good.

Discharge measurements of Leeds (Quail) Creek near Leeds, Utah, during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
1918				1920			
Dec. 16	L. W. Jordan	1.93	4.1	Apr. 19	W. E. Dickinson	4.92	12.8
				Sept. 19	A. B. Purton	4.70	5.4
1919							
Mar. 17	A. B. Purton	1.88	4.4				
Aug. 17	do	4.42	3.7				

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Daily gage height, in feet, of Leeds (Quail) Creek near Leeds, Utah, for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1							1.98					4.32
2		1.86							2.00			
3			1.92					1.92				
4								1.94		1.88		4.58
5	1.87	1.86				1.86	1.99					
6	1.88						2.00					
7			2.00					1.94	1.99			
8			2.2							1.89		
9		1.86	2.6	1.86			1.98		1.98			
10								1.95				
11								1.97	1.97	Flood		4.38
12	1.87			1.86			1.96					
13		1.87					1.97					
14												4.36
15						1.88			1.96			
16		1.88	1.92									
17						1.88		1.97			4.42	
18				1.86				1.98	1.94			
19	1.88						1.96					
20					1.86		1.95					4.36
21								2.52	1.98			
22				1.86		1.88		2.02				4.36
23		1.88									4.38	
24						1.90		2.01	1.91			
25								2.02			4.36	
26	1.86			1.86			1.94					
27	1.87						1.95					4.36
28			1.88			1.92		2.01				
29												
30		1.90									4.32	
31						1.98		2.01				
1919–20												
1						5.48		4.95				
2					4.44	5.40						
3						5.00	4.77	4.97				
4					4.44					5.25		
5	4.34	4.32					4.80	4.98	5.19			
6			4.32			4.98						
7					4.44							
8						4.90		4.99	5.21			
9			4.34		4.44	4.90						
10						4.88	4.81	4.99		5.21		
11						4.88	4.86					
12						4.84			5.23			
13				4.00		4.82						
14					4.44		4.87					
15					4.44	5.09		5.01				
16									5.26			
17				4.44		5.09	4.89					
18				4.44			4.92	5.03				
19					4.48		4.92					4.70
20				4.44		5.10						
21					5.00							
22						4.71		5.07	5.28			
23					6.50							
24				4.42	5.48		4.92	5.09				
25	4.32			4.42								
26								5.12	5.29			
27				4.42		4.70	4.94					
28			4.32		5.20							
29		4.30				4.78	4.95	5.13				
30									5.27			
31				4.42		4.78		5.15				

NOTE.—Ice in creek Dec. 6, 1919, to Jan. 13, 1920.

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Daily discharge, in second-feet, of Leeds (Quail) Creek near Leeds, Utah, for the period Feb. 24, 1920, to July 10, 1920

Day	Feb.	Mar.	Apr.	May	June	July	Day	Feb.	Mar.	Apr.	May	June	July
1		42		14			16					30	
2		37					17		21	12			
3		16	7	15			18			13	18		
4						29	19			13			
5			8	16	26		20		21				
6		15					21						
7							22		6		20	31	
8		12		16	27		23						
9		12					24	42		13	21		
10		11	9	16		27	25						
11		11	11				26				22	31	
12		10			28		27		5	14			
13		9					28	26					
14			11				29		8	14	22		
15		21		17			30					30	
							31		8		24		

Monthly discharge of Leeds (Quail) Creek near Leeds, Utah, for the period Mar. 1, 1920, to June 30, 1920

Month	Mean discharge in second-feet	Run-off in acre-feet
March	14.1	867
April	11.1	660
May	18.2	1,120
June	28.7	1,710
The period		4,360

SANTA CLARA CREEK NEAR CENTRAL, UTAH

LOCATION.—In sec. 11, T. 39 S., R. 16 W., just above ford at R. H. Hunt's ranch, 1 mile southeast of Central, Washington County, on road to Pine Valley. Hunt's spring, which has fairly constant discharge of about 3 second-feet, enters 10 feet below gage.

DRAINAGE AREA.—84 square miles (measured on topographic map.)

RECORDS AVAILABLE.—April 21, 1909, to September 30, 1920.

GAGE.—Vertical staff fastened to cottonwood tree on left bank about 20 feet above ford; read by R. H. Hunt. Datum of gage was raised 0.45 foot on January 20, 1910, 2.00 feet on February 22, 1916, and lowered 1.00 foot on August 12, 1918.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge.

CHANNEL AND CONTROL.—Bed consists of gravel and sand. Banks fairly high but may be overflowed at extreme stage; one channel at all stages. Control is at a riffle formed by small boulders just below ford; shifts at times.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 2.18 feet at 7 p. m. March 25 (discharge, 152 second-feet). Minimum stage recorded, 0.90 foot, February 15, July 3, August 14 and 21 (discharge, 6 second-feet).

Maximum stage recorded during year ending September 30, 1920, 2.88 feet on March 21 (discharge, 307 second-feet). Minimum stage recorded, 0.82 foot on January 8 (discharge, 4 second-feet).

1909–1920: Maximum stage recorded, 5.00 feet at 11 a. m. October 6, 1916 (discharge, 1,450 second-feet). Minimum stage recorded, 0.82 foot on January 8, 1920 (discharge, 4 second-feet).

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ICE.—Stage-discharge relation seldom affected by ice.

DIVERSIONS.—The New Castle Reclamation Co. has constructed a reservoir on Grass Valley Creek that has a capacity of 23,000 acre-feet. Water is diverted into the reservoir from Santa Clara Creek above town of Pine Valley, and released into tunnel through rim of the Great Basin for irrigation of lands outside the Colorado River basin. The Central canal diverts water about 2 miles above station for irrigation of lands near Central. This canal has been measured when it was carrying 16 second-feet.

REGULATION.—Flow affected by diversions and storage noted above.

ACCURACY.—Stage-discharge relation changed by sudden freshet on December 7, 1918; permanent thereafter. Rating curve used October 1 to December 7, 1918, fairly well defined; curve used December 8, 1918, to September 30, 1920, well defined between 4 and 50 second-feet; extended above. Gage read to hundredths once daily with frequent omissions of one to two days. Daily discharge ascertained by applying daily gage height to rating table, and by interpolating discharge for days when gage was not read. Records good.

Discharge measurements of Santa Clara Creek near Central, Utah, during the year ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1918		*Feet*	*Sec.-ft.*	1920		*Feet*	*Sec.-ft.*
Dec. 18	L. W. Jordan	1.00	9.1	Apr. 17	W. E. Dickinson	1.52	42.1
				Sept. 18	A. B. Purton	1.25	20.0
1919							
Mar. 15	A. B. Purton	1.03	10.4				
Aug. 16	do	0.94	6.8				

Daily discharge, in second-feet, of Santa Clara Creek near Central, Utah, for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	12	14	11	10	7	8	11	10	12	6	6	6
2	13	13	11	10	7	8	12	14	13	6	7	6
3	16	13	11	10	7	8	14	14	13	6	7	8
4	21	13	11	10	7	8	15	15	13	6	7	7
5	21	12	11	10	8	8	12	12	15	6	7	6
6	21	12	11	9	8	8	26	8	14	6	7	6
7	21	12	111	10	8	8	27	13	14	6	6	7
8	18	13	16	9	7	8	28	18	12	6	6	8
9	14	13	13	9	7	8	16	21	11	6	6	8
10	12	13	10	9	6	8	9	16	10	6	6	7
11	12	12	10	10	6	8	8	16	8	7	6	7
12	12	12	10	10	7	8	8	16	6	8	6	7
13	12	12	10	9	7	7	8	18	7	8	7	8
14	12	12	10	8	6	8	12	16	8	9	6	8
15	14	11	10	8	6	10	15	16	9	9	7	8
16	16	11	10	8	6	8	8	16	8	8	7	8
17	16	12	9	7	6	24	15	17	8	8	7	8
18	16	11	9	7	7	33	14	21	8	8	7	8
19	16	11	9	8	7	16	12	19	8	7	7	8
20	16	11	9	8	6	10	42	18	8	8	7	8
21	16	11	9	8	7	9	29	19	8	7	6	8
22	16	11	9	7	8	10	16	28	7	8	6	8
23	16	10	9	7	8	11	16	26	7	8	6	8
24	16	10	9	7	8	12	16	28	9	7	6	8
25	16	10	9	7	7	58	16	23	8	6	6	8
26	15	11	9	7	7	14	15	18	6	6	6	26
27	15	11	10	7	7	13	10	14	8	7	6	10
28	15	11	10	7	7	12	10	25	8	9	6	8
29	15	11	10	7	.....	16	10	26	7	9	6	10
30	14	11	10	7	.....	16	10	12	7	8	6	8
31	14	.....	9	7	.....	11	.....	12	.....	7	6	.....

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Daily discharge, in second-feet, of Santa Clara Creek near Central, Utah, for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919-20												
1	8	8	6	9	8	13	16	76	106	23	17	25
2	9	8	9	7	8	169	16	66	82	23	33	22
3	9	9	8	7	9	35	16	52	69	19	23	22
4	9	9	8	8	9	36	16	47	68	16	23	22
5	9	9	8	6	9	26	63	42	66	15	23	22
6	9	9	10	5	9	15	79	45	66	14	22	22
7	9	8	8	5	10	14	194	52	66	15	22	22
8	9	8	9	4	9	12	63	45	66	14	27	22
9	9	8	9	4	9	12	79	52	63	14	23	22
10	10	8	9	5	9	12	50	66	54	14	23	22
11	10	9	8	5	9	11	50	53	45	13	22	22
12	10	9	7	6	11	10	45	40	38	14	21	22
13	10	8	7	5	10	10	42	38	32	15	20	22
14	9	8	7	5	14	10	38	40	31	15	18	21
15	9	8	7	5	12	9	50	40	29	14	18	21
16	9	8	7	6	16	9	60	40	26	14	17	21
17	9	8	7	5	10	16	42	60	23	14	17	19
18	9	8	7	6	9	22	45	96	22	14	17	21
19	9	8	8	6	14	17	38	125	18	14	17	20
20	8	8	8	7	12	12	35	160	18	14	17	19
21	8	8	8	10	152	307	33	220	18	13	17	19
22	8	8	8	8	38	22	31	185	17	12	19	18
23	8	8	8	7	11	20	29	156	16	26	19	18
24	8	8	8	7	12	18	29	158	15	14	20	19
25	7	8	8	7	12	16	29	160	13	13	21	19
26	6	7	8	8	13	16	29	140	13	12	21	19
27	6	6	8	8	11	17	38	138	17	13	19	19
28	6	6	8	8	11	14	42	136	40	14	19	19
29	7	7	8	8	12	15	45	125	47	16	21	18
30	7	6	8	8	------	16	60	121	31	17	25	18
31	7	------	8	8	------	18	------	117	------	17	25	------

Monthly discharge of Santa Clara Creek near Central, Utah, for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	21	12	15.5	953
November	14	10	11.7	696
December	111	9	13.4	824
January	10	7	8.29	510
February	8	6	6.96	387
March	58	7	12.7	781
April	42	8	15.1	898
May	28	8	17.6	1,080
June	15	6	9.33	555
July	9	6	7.16	440
August	7	6	6.39	393
September	96	6	10.6	631
The year	111	6	11.3	8,150
1919-20				
October	10	6	8.39	516
November	9	6	7.98	472
December	10	6	7.90	486
January	10	4	6.55	403
February	152	8	16.5	949
March	307	9	30.6	1,880
April	194	16	46.7	2,780
May	220	38	93.3	5,740
June	106	13	40.3	2,400
July	26	12	15.3	941
August	33	17	20.8	1,280
September	25	18	20.6	1,230
The year	307	4	26.3	19,1[illegible]

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GILA RIVER AND TRIBUTARIES

GILA RIVER NEAR SOLOMONVILLE, ARIZ.

LOCATION.—In NE. ¼ sec. 31, T. 6 S., R. 28 E., 1 mile below intake of Brown canal and 10 miles above Solomonville, Graham County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 21, 1914, to September 30, 1920.

GAGE.—Stevens continuous water-stage recorder on left bank, directly opposite J. W. Earven's ranch, inspected by J. W. Earven.

DISCHARGE MEASUREMENTS.—Made from cable just below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel, sand, and silt; shifts considerably during rises.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 6.6 feet at 1.30 a. m. August 3 (discharge, 23,500 second-feet); minimum stage, 0.76 foot October 8 to 11 (discharge, 69 second-feet).

Maximum stage recorded during year ending September 30, 1920, 5.2 feet at 3 p. m. December 5 (discharge, 7,620 second-feet); minimum stage, 0.8 foot July 12–14 (discharge, 78 second-feet).

1914–1920: Maximum stage recorded, determined from flood marks on gage, 14.0 feet January 19, 1916 (discharge, about 100,000 second-feet from extension of rating curve); minimum discharge, 64 second-feet, June 29, 1914.

DIVERSIONS.—Brown canal, which is used to irrigate a few hundred acres on the north side of the river, at the head of Safford Valley, diverts water about 1 mile upstream from the station; maximum capacity about 25 second-feet. About 8,000 acres are irrigated from Gila River above the gaging station, principally in Duncan Valley.

ACCURACY.—Water year ending September 30, 1919: Stage-discharge not permanent. Standard rating curve used with shifting-control method is fairly well defined below 3,000 second-feet. Twenty-two discharge measurements were made during year by means of which the changes in stage-discharge relation were determined with fair accuracy, except for high stages. The operation of the water-stage recorder was satisfactory throughout the year except for October 27 to November 2, November 30, and December 1, when clock stopped; record May 9–15, July 8–19, 24–30, August 10–16, and 22–26, when float rested on mud in stilling well corrected for mud effect. Daily discharge determined throughout the year by shifting-control method. Discharge interpolated for missing periods and estimated July 8–11. Records fair.

Water year ending September 30, 1920: Stage-discharge fairly permanent between rises. Twenty-four measurements made during the year defined rating curves used as follows: October 1 to December 5, fairly well defined below 200 second-feet; December 6 to February 10, fairly well defined; February 11 to August 14, fairly well defined between 70 and 2,500 second-feet; August 15 to September 30, fairly well defined below 1,000 second-feet. Water-stage recorder checked on days when measurements were made by H. D. Empie, water commissioner for Safford Valley, and at other times by J. W. Earven. Except for period March 31 to April 4, when paper roll became exhausted, the operation of the recorder was satisfactory. Daily discharge ascertained by applying mean daily gage height to rating table. Discharge interpolated for missing period March 31 to April 4. Records good for low and medium stages, fair for high stages.

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Discharge measurements of Gila River near Solomonville, Ariz., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1918		*Feet*	*Sec.-ft.*	1919		*Feet*	*Sec.-ft.*
Oct. 2	H. D. Emple	0.78	78	Oct. 15	H. D. Emple	1.62	336
19	C. E. Ellsworth	.84	79	Nov. 1	do	1.42	288
Nov. 4	H. D. Emple	1.16	175	15	do	1.39	239
Dec. 2	do	1.28	225	Dec. 3	do	1.96	608
				16	do	2.02	578
1919							
Jan. 4	do	1.46	334	1920			
18	J. F. Kunesh	1.66	408	Jan. 3	do	1.74	386
18	H. D. Emple	1.66	435	14	Kunesh and Emple	2.15	613
Feb. 3	do	2.24	1,050	Feb. 2	H. D. Emple	2.29	876
Mar. 1	do	1.61	398	16	do	2.60	1,620
17	Kunesh and Emple	2.45	1,390	Mar. 2	do	2.58	1,560
Apr. 1	H. D. Emple	3.35	2,780	16	do	2.24	981
15	do	2.81	1,750	Apr. 5	do	2.39	1,140
May 3	do	2.43	1,190	18	do	2.22	863
19	do	1.50	330	May 3	do	2.06	624
June 2	do	1.30	283	17	do	1.78	507
16	do	.88	104	June 1	do	1.42	296
July 1	do	1.18	212	15	do	1.32	241
20	do	2.26	835	30	do	1.14	180
Aug. 2	do	3.95	3,710	July 15	do	.82	82
17	do	1.94	579	Aug. 1	do	1.18	183
Sept. 1	do	1.60	400	16	do	2.09	508
15	do	1.75	460	Sept. 1	do	1.28	151
Oct. 1	do	1.58	335	15	do	1.12	119

NOTE.—A measurement was attempted on July 15, 1919, but was abandoned when current meter was lost.

Daily discharge, in second-feet, of Gila River near Solomonville, Ariz., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	74	193	220	365	700	400	2,820	1,470	325	258	966	306
2	74	187	222	355	1,390	395	3,050	1,290	306	270	5,080	238
3	77	180	222	330	1,100	390	3,110	1,190	270	660	7,380	222
4	77	180	210	330	854	385	3,140	1,050	246	526	2,380	218
5	77	176	206	330	756	380	3,210	966	222	596	1,550	214
6	75	172	206	330	660	375	2,990	882	206	882	1,050	214
7	72	169	210	335	596	370	2,840	816	190	952	2,360	230
8	69	169	290	340	526	370	2,620	804	166	996	997	298
9	69	166	290	350	477	375	2,400	750	152	900	1,220	320
10	69	166	380	360	470	380	2,180	697	134	800	854	320
11	69	162	340	375	505	385	1,880	642	127	700	630	294
12	74	158	320	395	526	390	1,710	589	120	808	680	532
13	77	158	306	422	580	440	1,670	535	115	700	680	768
14	77	218	294	505	596	780	1,710	482	112	4,350	854	512
15	75	290	278	491	572	1,390	1,730	428	104	6,800	792	440
16	75	246	270	446	548	1,690	1,650	375	104	2,670	630	350
17	75	222	266	395	519	1,450	1,590	370	101	3,110	604	320
18	75	210	274	416	512	1,130	1,350	350	96	2,160	656	298
19	82	202	282	428	498	1,150	1,060	325	101	1,130	756	274
20	298	186	282	422	484	1,750	997	315	98	868	680	282
21	310	186	290	434	477	2,360	980	302	96	816	548	325
22	446	180	360	434	458	3,140	952	298	93	1,050	470	274
23	290	176	428	416	446	3,470	952	302	98	768	410	370
24	254	194	405	405	434	3,370	910	350	98	612	360	556
25	242	242	380	410	428	2,980	854	360	96	498	310	422
26	234	310	345	405	416	2,430	868	458	104	434	310	380
27	227	254	325	416	410	2,110	924	588	98	355	366	477
28	220	238	325	416	400	1,950	2,020	512	96	434	278	640
29	213	218	330	400	-------	1,970	1,970	477	106	434	340	477
30	206	220	335	390	-------	2,180	1,730	410	194	246	290	400
31	200	-------	345	385	-------	2,650	-------	370	-------	660	282	-------

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Daily discharge, in second-feet, of Gila River near Solomonville, Ariz., for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919–20												
1	347	237	625	395	795	1,620	1,140	620	280	160	258	148
2	289	237	625	395	850	1,520	1,140	670	258	144	346	148
3	289	237	588	395	910	1,420	1,140	670	258	144	323	148
4	263	237	625	427	910	1,330	1,140	670	237	127	323	206
5	263	237	2,400	560	850	1,330	1,140	620	237	127	302	206
6	263	237	3,400	600	850	1,240	1,140	620	258	114	302	189
7	237	215	2,100	640	850	1,060	1,140	580	237	114	302	174
8	237	215	1,400	640	850	1,060	1,140	508	237	100	302	174
9	237	215	1,040	560	2,100	980	1,140	540	217	100	302	160
10	215	237	850	526	5,820	980	1,140	580	217	89	302	148
11	263	237	795	560	6,370	1,140	1,140	580	237	89	346	135
12	289	237	795	690	4,820	1,060	1,140	540	395	78	620	135
13	347	215	690	640	3,280	910	1,060	508	302	78	840	126
14	378	215	640	640	2,450	910	980	475	258	78	1,060	126
15	347	237	600	850	2,020	910	910	475	237	89	650	126
16	318	237	560	795	1,720	910	910	475	217	89	550	224
17	318	237	560	795	1,620	910	840	448	197	100	510	770
18	289	237	560	970	1,420	840	910	448	197	89	355	1,120
19	289	237	526	970	1,330	780	910	420	278	89	710	174
20	289	263	526	1,040	1,240	780	910	420	160	89	510	148
21	289	318	526	1,100	2,560	780	840	395	160	114	355	148
22	263	318	526	1,040	5,380	780	840	395	144	278	710	135
23	263	289	526	1,040	6,080	780	780	420	144	278	410	126
24	237	289	492	1,040	5,240	840	720	395	144	160	330	126
25	237	318	492	910	3,910	1,060	720	370	144	144	710	116
26	237	318	460	850	3,040	1,060	720	370	144	144	550	116
27	263	318	460	850	2,340	1,060	720	346	144	197	305	109
28	263	1,070	460	850	2,020	1,060	670	346	278	280	244	109
29	263	800	427	795	1,720	1,140	670	302	197	323	206	109
30	237	550	427	795	-------	1,140	620	302	278	258	189	109
31	237	-------	427	795	-------	1,140	-------	280	-------	197	174	-------

Monthly discharge of Gila River near Solomonville, Ariz., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	446	69	147	9,040
November	310	158	201	12,000
December	428	206	296	18,200
January	505	330	395	24,300
February	1,390	400	584	32,400
March	3,470	370	1,380	84,900
April	3,210	854	1,860	111,000
May	1,470	298	603	37,100
June	325	93	146	8,690
July	6,800	246	1,170	71,900
August	7,380	278	1,120	68,900
September	768	214	366	21,800
The year	7,380	69	691	500,000
1919–20				
October	378	215	276	17,000
November	1,070	215	308	18,300
December	3,400	427	811	49,900
January	1,100	395	747	45,900
February	6,370	795	2,530	146,000
March	1,620	780	1,050	64,600
April	1,140	620	947	56,400
May	670	280	477	29,300
[illegible]	395	144	223	13,300
[illegible]	323	78	144	8,850
[illegible]er	1,060	174	432	26,600
[illegible]	1,120	109	200	11,900
[illegible]e year	6,370	78	671	488,000

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GILA RIVER NEAR SAN CARLOS, ARIZ.

LOCATION.—One mile above dam site in box canyon on San Carlos Indian Reservation, 8 miles below mouth of San Carlos River and 6 miles below San Carlos Indian Agency, San Carlos, Gila County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 29, 1914, to September 30, 1920, at present site; July 11, 1899, to November 27, 1905, at point half a mile south of Indian Agency at San Carlos, and below San Carlos River; August 17, 1910, to February 5, 1911, at point just below Arizona Eastern Railroad bridge and half a mile above San Carlos River.

GAGE.—Stevens continuous water-stage recorder on left bank, inspected by R. D. Morgan (1919), John Sutherland, S. Smith, and W. Carlos (1920).

DISCHARGE MEASUREMENTS.—Made from cable 1 mile above gage or by wading near gage.

CHANNEL AND CONTROL.—Bed consists of sand, gravel, and boulders, shifting. Control marked by rapids and heavy boulders just below gage, shifts somewhat because of sand filling in and washing out between boulders. At low stages river is away from gage and it is necessary to maintain a ditch from gage to river. Much trouble has been encountered in keeping this ditch open between visits of observers, especially so as the station is isolated and can not be inspected frequently.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 11.3 feet at 6 a. m., August 3 (discharge, 16,100 second-feet); minimum stage, stream dry June 28 to July 1.

Maximum stage during year ending September 30, 1920, from water-stage recorder, 13.0 feet at 1 p. m. February 21 (discharge, 23,000 second-feet) minimum stage, record broken.

1914–1920: Maximum stage, 25.5 feet, January 20, 1916 (discharge from extension of rating curve, about 92,000 second-feet); minimum stage, dry June 28 to July 1, 1919.

DIVERSIONS.—Water for irrigating about 33,000 acres is diverted from river above station by Safford Valley. About 8,000 acres is irrigated from this stream above station near Solomonville.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve fairly well defined below 14,000 second-feet, and poorly defined above. Shifting-control method used from October 1, 1918, to April 29, 1920; and from April 30 to September 30, 1920, the standard curve applied direct except as indicated in footnote to daily-discharge table. Difficulty in keeping ditch from gage to river open during low-water periods caused the recorder graph to be unreliable although recorder was in operation. At other times the operation of the water-stage recorder was reasonably satisfactory except as indicated in footnote to daily-discharge table. Records poor for low stages, fair for medium stages, and poor for high stages.

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Discharge measurements of Gila River near San Carlos, Ariz., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
1918				1919			
Oct. 18	C. E. Ellsworth	0.42	9.4	Aug. 21	J. F. Kunesh	2.66	407
				Sept. 7	do	1.58	86
1919				25	do	2.26	319
Jan. 17	J. F. Kunesh	3.53	552	Dec. 12	do	4.01	1,200
20	do	3.22	427				
Feb. 7	do	3.87	746	1920			
26	do	3.48	467	Jan. 13	do	3.67	874
Mar. 16	do	3.58	700	Feb. 6	do	3.69	902
19	do	4.00	1,090	26	do	6.88	3,940
Apr. 5	do	5.48	2,830	Mar. 17	do	3.46	712
23	do	4.00	1,150	Apr. 29	H. D. Emple	2.18	224
May 14	do	2.50	246	June 12	J. F. Kunesh	.91	28
30	do	2.06	153	Sept. 11	C. W. Sopp	.94	29
June 13	do	1.01	27	23	do	1.14	47
July 5	do	3.25	608				

Daily discharge, in second-feet, of Gila River near San Carlos, Ariz., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1					676		2,470	1,310	107	0	3,280	
2					1,480		2,640	1,230	89	828	4,770	200
3					1,480		2,860	1,120	77	924	11,300	
4					1,190		2,980	1,000	66	666	4,740	
5					938		2,860	938	59	844		101
6					840		2,580	872	52	2,650		137
7		30			745		2,520	775	48	1,480		89
8					444	350	2,520	699	44	1,560		473
9	10			250	585		2,370	623	39	1,740		303
10					660		2,170	547	37	1,310		228
11					565		1,920	472	34	1,040		203
12					585		1,790	397	30	970	1,500	255
13					570		1,610	321	27	1,040		938
14		44			605		1,610	245	24	1,670		872
15		87			610	464	1,610	245	21	6,010		580
16		62	350		575	649	1,610	220	18	4,360		
17		65		555	546	1,270	1,610	200	15	4,020		
18	10	76		513	527	1,270	1,520	180	12	3,220		
19	9	89		473	490	1,120	1,430	160	10	3,740		
20	11	96		428	413	1,120	1,310	140	8			350
21	228	101		400	387	1,390	1,270	120	6		377	
22	125	104		391	499	1,840	1,190	100	5		357	
23	100	104		391	546	2,320	1,150	100	4		294	
24	107	125		327	495	2,580	1,080	100	3		201	
25	72	212		283	482	2,520	1,000	100	2	1,500	196	315
26	56	206		286	468	2,220	970	100	1		288	336
27	49	209		228	464	1,970	1,080	100	1		272	1,440
28	44	243		230	450	1,880	1,120	100	0			610
29	40	218		207	------	2,020	1,430	100	0		280	580
30	36	196		198	------	2,170	1,480	159	0			513
31	30	------		263	------	2,370	------	137	------			------

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Daily discharge, in second-feet, of Gila River near San Carlos, Ariz., for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919-20												
1	486	294	1,140	452	1,000	1,740	745	194	31			
2	444	291	970	444	1,000	1,480	775	184	31			
3	428	288	1,000	460	1,000	1,350	775	216	31			100
4	413	288	1,000	632	970	1,310	745	240	31			
5	398	288	8,000	872	938	1,190	745	240	31			
6	387	288	7,000	1,230	905	1,120	676	240	31			
7	374	288	6,000	1,390	938	1,040	605	228	28			
8	361	286	4,000	905	1,000	938	575	205	28			50
9	351	283	3,000	775	3,340	840	546	173	28			
10	342	280	2,000	704	6,780	872	504	153	28			
11	342	280	1,500	710	9,460	840	517	153	28			34
12	345	280	1,270	808	7,070	872	590	163	31			34
13	348	280	1,080	840	4,840	840	616	173	42			31
14	339	280	970	840	3,700	775	590	163	42			31
15	333	280	905	1,000	2,980	710	532	153	42			31
16	324	280	808	1,230	2,520	745	499	144	46	48.4	2.58	34
17	321	280	745	1,150	2,170	693	444	135	42			50
18	318	280	715	1,150	1,880	632	417	135	38			294
19	318	280	671	1,310	1,700	595	391	144	34			194
20	315	280	654	1,480	1,560	532	374	144	31			135
21	312	280	638	1,610	8,070	490	342	144	28			97
22	309	301	616	1,880	4,390	468	324	135	25			71
23	309	575	595	1,790	6,340	477	309	119	22			46
24	306	970	570	1,790	5,890	590	294	104	16			42
25	303	872	550	1,790	4,640	840	280	90	14			38
26	303	628	546	1,560	3,940	1,000	266	77	71			34
27	303	757	541	1,430	3,050	938	250	65	90			34
28	300	1,290	541	1,270	2,470	1,040	235	55	205			50
29	297	1,740	517	1,120	2,020	1,120	223	46	205			50
30	297	1,310	490	1,040	-------	938	205	38	119			28
31	294	-------	464	970	-------	808	-------	34	-------			-------

NOTE.—Discharge interpolated May 8-13, 1919; discharge estimated Oct. 1-17, Nov. 1-13, Dec. 1-31, 1918, Jan. 1-16, Feb. 28, Mar. 1-14, May 16-29, July 26-31, Aug. 5-20, 28-31, Sept. 1-4, 16-24, Dec. 3-11, 1919. During period July 1 to Sept. 10, 1920, graph record very unreliable on account of mud in stilling well, see estimated monthly mean in tables of monthly discharge. Braced figures show mean discharge for periods indicated.

Monthly discharge of Gila River near San Carlos, Ariz., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	228	-------	35.1	2,160
November	243	-------	87.4	5,200
December	-------	-------	350	21,500
January	-------	-------	296	18,200
February	1,480	387	652	36,200
March	2,580	-------	1,199	67,600
April	2,980	970	1,790	107,000
May	1,310	100	416	25,600
June	107	0	28.0	1,670
July	6,010	0	1,760	108,000
August	11,300	-------	1,640	101,000
September	1,449	-------	401	23,900
The year	11,300	0	715	518,000

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Monthly discharge of Gila River near San Carlos, Ariz., for the years ending Sept. 30, 1919 and 1920—Continued

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919-20				
October	486	294	343	21,100
November	1,740	280	480	28,600
December	8,000	464	1,600	98,400
January	1,880	444	1,120	68,900
February	9,460	905	3,330	192,000
March	1,740	468	898	55,200
April	775	205	480	28,600
May	240	34	145	8,920
June	205	14	49.0	2,920
July			*48.4	2,980
August			*258	15,900
September		28	70.3	4,180
The year	9,460		725	528,000

* Estimated by comparison with records on Gila River at Kelvin and near Solomonville, and San Pedro River at Fairbank.

GILA RIVER AT KELVIN, ARIZ.

LOCATION.—In sec. 12, T. 4 S., R. 13 E., one-quarter mile [5] below mouth of Mineral Creek, three-eighths mile below concrete highway bridge, 1 mile below Kelvin, Pinal County, and 25 miles above Florence.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 26, 1911, to September 30, 1920.

GAGE.—Stevens continuous water-stage recorder on left bank. For description of previous gages used at this station, see Water-Supply Paper 479, p. 151.

DISCHARGE MEASUREMENTS.—Made from highway bridge three-eighths of a mile above gage or by wading.

CHANNEL AND CONTROL.—Channel composed of sand, gravel, and silt above gage with a riffle composed of gravel and medium-sized boulders; control semi-permanent. At low stages sand fills in on the control and near the gage, and produces a somewhat shifting control until the next rise washes out the sand.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 9.23 feet at 12.30 p. m. August 3 (discharge, 20,800 second-feet); minimum stage, 1.9 feet, October 19 (discharge, 9 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 10.3 feet at 8 p. m. December 5 (discharge, 25,800 second-feet); minimum stage, 1.55 feet July 18 (discharge, 6 second-feet).

1911–1920: Maximum stage, 19.5 feet about noon January 20, 1916, determined from flood marks (discharge from extension of rating curve, about 93,000 second-feet); no flow June 29 to July 11, 1913.

DIVERSIONS.—About 33,000 acres are irrigated from this stream between this station and Solomonville, and about 8,000 acres above Solomonville.

[5] Given in previous reports as one-half mile.

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ACCURACY.—Stage-discharge relation semipermanent. Standard rating curve used for shifting-control method applicable for year ending September 30, 1919, fairly well defined below 30,000 second-feet, poorly defined above. For year ending September 30, 1920, several rating curves fairly well defined by measurements and generally parallel to one another were used for the following periods: October 1, 1919, to February 11, 1920, February 12 to August 12, August 13 to September 19, and September 20–30, 1920. High-water discharge measurements subject to considerable error, owing to difficulty in obtaining accurate soundings. Operation of water-stage recorder satisfactory, except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying mean daily gage height to rating table except as indicated in footnote to daily-discharge table. Records fair.

Discharge measurements of Gila River at Kelvin, Ariz., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1918		*Feet*	*Sec.-ft.*	1919		*Feet*	*Sec.-ft.*
Oct. 17	C. E. Ellsworth	1.89	10	July 8	J. F. Kunesh	4.42	4,630
23	do	2.62	138	14	do	3.07	1,410
Dec. 5	J. F. Kunesh	2.77	231	Aug. 19	do	3.23	786
1919				Sept. 5	do	2.49	120
Jan. 22	do	2.96	480	26	do	3.07	401
23	do	2.96	489	Oct. 2	do	3.05	383
Feb. 6	do	3.24	1,400	Dec. 10	do	4.27	2,360
24	do	3.00	675	14	do	3.75	1,210
Mar. 14	do	2.61	218	24	do	3.48	786
20	do	3.12	1,110	1920			
Apr. 4	do	4.18	3,220	Jan. 23	do	4.17	2,230
6	do	4.06	2,870	Feb. 5	do	3.72	1,120
22	do	3.11	1,220	24	do	5.68	7,100
30	do	3.42	1,650	Mar. 16	do	3.37	902
May 13	do	2.82	346	Apr. 30	H. D. Emple	2.78	291
28	do	2.46	93	June 11	J. F. Kunesh	2.13	54
29	do	2.70	182	July 11	do	1.73	14
June 12	do	2.26	40	Sept. 12	C. W. Sopp	2.30	76
July 4	do	3.12	1,830	26	do	2.25	55

Daily discharge, in second-feet, of Gila River at Kelvin, Ariz., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	10			435	1,040	417	2,450	1,510	123	211	3,670	381
2	10		200	363	2,290	408	2,800	1,280	112	313	11,000	142
3	10			337	2,950	399	3,120	1,060	93	2,360	10,200	142
4	10	40		7	2,630	399	3,200	922	84	1,690	11,400	123
5	10		231	5	1,850	372	3,100	846	69	2,680	6,880	116
6	10		238	309	1,360	337	2,920	810	64	5,180	3,440	161
7	10	32	258	345	1,100	313	2,850	714	57	4,180	2,700	245
8	14		435	354	961	297	2,950	642	55	3,900	2,470	896
9	14		445	354	846	281	2,750	550	53	3,000	2,360	935
10	14		399	444	810	258	2,380	511	48	1,230	2,050	492
11	13		354	502	822	245	2,070	444	44	1,390	1,850	473
12	12		473	560	1,200	224	1,810	444	37	1,030	1,710	454
13	10		482	610	1,120	204	1,600	381	42	1,280	1,600	961
14	10		473	714	846	211	1,520	345	42	1,410	1,490	1,360
15	10		426	666	810	321	1,610	297	39	8,000	1,420	1,080
16	10	100	399	702	822	408	1,710	238	36	12,000	1,370	610
17	10		381	714	774	922	1,730	187	33	11,400	2,690	454
18	10		337	590	774	1,330	1,630	161	29	8,680	1,390	426
19	9		363	520	810	1,140	1,340	138	27	6,540	786	399
20	12		345	511	846	1,120	1,250	119	23	4,410	909	399
21	24		399	511	822	1,360	1,250	108	22	2,650	786	390
22	211		948	452	883	1,910	1,250	99	22	3,000	750	390
23	138		948	511	786	2,520	1,180	102	22	2,150	714	390
24	146		540	520	678	3,150	1,210	105	21	1,890	702	390
25	142	161	454	492	654	3,280	1,120	108	18	1,710	666	390
26	96		363	473	570	2,800	1,060	108	16	1,510	1,100	381
27	78		345	464	540	2,210	1,200	99	15	2,320	1,450	1,330
28		200	337	444	469	1,910	1,200	105	14	4,260	550	1,120
29	49		329	435	-------	1,910	1,410	116	14	2,430	454	550
30			464	426	-------	2,090	1,710	96	18	1,770	473	502
31		-------	600	473	-------	2,340	-------	135	-------	2,050	426	-------

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Daily discharge, in second-feet of San Simon Creek near San Simon, Ariz., for the period Aug. 1, 1919, to Sept. 30, 1920

	Discharge		Discharge		Discharge
1919		1919		1920	
Aug. 2	415	Nov. 26	395	Aug. 3	35
3	52	27	46	12	17
13	14	28	58	13	20
16	475	29	100	14	37
29	15	30	5	19	96
30	17	Dec. 1	3	20	10
Sept. 7	3	2	3	21	528
Oct. 11	18	4	1	22	192
12	49			23	12
13	4	1920		24	127
14	1	Apr. 2	22	25	37
Nov. 24	52	June 28	2	26	21
25	570	Aug. 2	200	Sept. 17	2

NOTE.—No flow on days during the period for which no discharge is given.

Monthly discharge of San Simon Creek near San Simon, Ariz., for the period Aug. 1, 1919, to Sept. 30, 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
August	475	0	31.8	1,960
September	3	0	.10	6
The period				1,970
1919–20				
October	49	0	2.32	143
November	570	0	40.8	2,430
December	3	0	.22	14
April	22	0	.73	43
June	2	0	.07	4
August	528	0	43.0	2,640
September	2	0	.07	4
The year	570	0	7.28	5,280

NOTE.—No flow during months for which no record is given.

CAVE CREEK NEAR PARADISE, ARIZ.

LOCATION.—In SW. ¼ SE. ¼ sec. 34, T. 17. S., R. 31 E., at Portal ranger station, 8 miles by road southeast of Paradise, Cochise County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 5, 1919, to September 30, 1920.

GAGE.—Vertical enamel staff on right bank 100 feet from ranger station; read by Mrs. O. P. Schoenberg.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Channel composed of gravel and boulders. Channel fairly straight and fairly uniform in cross section.

EXTREMES OF DISCHARGE.—Maximum stage for period August 5 to September 30, 1919, 4.31 feet on August 9 (discharge, 41 second-feet); minimum discharge, trace of water only, August 14–18, 20–31, September 1–6, and 18–25.

Maximum stage for year ending September 30, 1920, 5 feet November 21 (discharge, 3,000 second-feet); minimum discharge zero July 19 to August 20.

DIVERSIONS.—Cave Creek canal diverts water 700 feet above station on left bank, records of which are given in this report. One other canal diverts water to about 5 acres above station.

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ACCURACY.—Stage-discharge relation fairly permanent; rating curves fairly well defined to 60 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating tables and by hydrograph during flood periods, except for periods August 14–18, 20–31, September 1–6, 18–25, October 6–10, 20–31, November 1–5, 1919, and July 6–18, September 28–30, 1920, when there was a trace of water only, and July 19 to August 20, 1920, when stream was dry. Records fair.

COOPERATION.—Discharge measurements and record of daily discharge furnished by University of Arizona, Prof. G. E. P. Smith, irrigation engineer.

Discharge measurements of Cave Creek near Paradise, Ariz., during the period Aug. 5, 1919, to Sept. 30, 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft.*	1920		*Feet*	*Sec.-ft.*
Aug. 5	Schwalen and Kunesh	1.12	8.1	Mar. 3	H. C. Schwalen	1.13	17
26	H. C. Schwalen	.66	.14	26	do	.97	7.4
Oct. 11	Schwalen and Code	.68	.14	June 1	G. E. P. Smith	.65	2.0
Dec. 3	Schwalen and Smith	1.40	43.3	July 2	H. C. Schwalen	.58	.16
1920				Aug. 24	do	.74	1.7
Feb. 11	H. C. Schwalen	1.52	68	25	do	.91	4.2

Daily discharge, in second-feet, of Cave Creek near Paradise, Ariz., for the period Aug. 5, 1919, to Sept. 30, 1920

Day	Aug.	Sept.	Day	Aug.	Sept.	Day	Aug.	Sept.
1919			1919			1919		
1			11	7.5	7.5	21		
2			12	6.5	5	22		
3			13	4.5	3	23		
4			14		3	24		
5	9		15		2	25		
6	7		16		1	26		1
7	6.5	12	17		.5	27		1.5
8	6.5	12	18			28		2.5
9	30	7.5	19	2.5		29		2.5
10	14	7.5	20			30		2.5
						31		

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Daily discharge, in second-feet, of Cave Creek near Paradise, Ariz., for the period Aug. 5, 1919, to Sept. 30, 1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919-20												
1	2.5	------	76	2.5	12	18	8	6	1	0.5	------	0.5
2	4.5	------	61	2.5	10	18	8	6	1	.5	------	.5
3	3.5	------	45	2.5	9	17	7.5	6	1	.5	------	.5
4	3.5	------	33	4	9	16	6.5	6.5	1	.5	------	1
5	3.5	------	38	4	8	14	6.5	8	1	.5	------	1
6	------	0.5	33	4	7.5	14	7.5	8	1	------	------	1
7	------	.5	29	3.5	14	13	7.5	8	1	------	------	1
8	------	1	23	3.5	33	12	8	8	1	------	------	1
9	------	1	23	3.5	100	12	8	8	1	------	------	1
10	------	1	23	4	100	13	8	7.5	1	------	------	1
11	10	1	14	4	61	12	7.5	6.5	1	------	------	1
12	26	.5	13	3.5	46	8	6.5	5	1	------	------	1
13	23	.5	12	3.5	41	8	4.5	3	1	------	------	1
14	10	.5	8	4	33	8	4.5	2.5	1	------	------	.5
15	7.5	.5	8	4.5	27	7.5	4.5	2	.5	------	------	.5
16	4.5	.5	7.5	4.5	23	7.5	4.5	2	.5	------	------	1
17	2	.5	7.5	7.5	21	7.5	14	2	.5	------	------	.5
18	1	.5	7.5	18	18	7.5	14	1.5	.5	------	------	.5
19	1	.5	7.5	23	18	6.5	14	1.5	.5	------	------	.5
20	------	1	6.5	46	33	6.5	8	1	.5	------	------	.5
21	------	280	6	46	89	6.5	5	1	.5	------	1	.5
22	------	2,500	5	46	82	6.5	5	1	.5	------	2	.5
23	------	290	4.5	43	73	6	5	1	.5	------	2	.5
24	------	210	4.5	31	61	8	8	1	.5	------	2.5	.5
25	------	170	4	23	46	4.5	8	1	.5	------	4.5	.5
26	------	108	4	23	36	4.5	9	1	.5	------	4.5	.5
27	------	110	4	20	31	4.5	8	1	.5	------	4	.5
28	------	110	3.5	18	23	4.5	8	1	.5	------	2	------
29	------	110	3.5	14	19	4.5	7.5	1	.5	------	2	------
30	------	91	3	14	------	4.5	6.5	1	.5	------	1	------
31	------	------	3	13	------	7.5	------	1	------	------	1	------

NOTE.—For days on which no discharge is given see "accuracy" paragraph.

Monthly discharge of Cave Creek near Paradise, Ariz., for the period Aug. 5, 1919, to Sept. 30, 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
August 5-31	30	------	3.48	186
September	12	------	2.37	141
The period	------	------	------	327
1919-20				
October	26	------	3.31	204
November	2,500	------	133	7,910
December	76	3	16.6	1,020
January	46	2.5	14.3	879
February	100	7.5	37.4	2,130
March	18	4.5	9.28	571
April	14	4.5	7.58	451
May	8	1	3.55	218
June	1	.5	.73	43
July	.5	0	.08	5
August	4.5	0	.85	52
September	1	------	.63	37
The year	2,500	0	18.6	13,500

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CAVE CREEK CANAL NEAR PARADISE, ARIZ.

LOCATION.—In SW. ¼ SE. ¼ sec. 34, T. 17 S., R. 31 E., at Portal ranger station of United States Forest Service, 750 feet below head of canal and 8 miles southeast of Paradise, Cochise County.

RECORDS AVAILABLE.—October 14, 1919, to September 30, 1920.

GAGE.—Vertical staff on left bank; read by Mrs. O. P. Schoenberg.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Earth section. Bed composed of small gravel.

EXTREMES OF DISCHARGE.—Maximum daily mean discharge for period October 14, 1919, to September 30, 1920. 8.8 second-feet May 10–15, 1920; no flow during periods of year.

DIVERSIONS.—Above all diversions from ditch.

REGULATIONS.—Flow controlled by head gates.

ACCURACY.—Stage discharge fairly permanent. Rating curves poorly defined. Staff gage read to half-tenths daily and oftener during flood periods. Daily discharge ascertained by applying mean daily gage height to rating tables except when shifting-control method was used, and as indicated in footnote to daily discharge table. Records fair.

COOPERATION.—Discharge measurements and record of daily discharge furnished by University of Arizona, Prof. G. E. P. Smith, irrigation engineer.

Discharge measurements of Cave Creek canal near Paradise, Ariz., during the period Oct. 11, 1919, to Sept. 30, 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 11	Schwalen and Code		3.7	Aug. 24	H. C. Schwalen	1.57	3.8
Mar. 26	H. C. Schwalen	1.50	1.4	25	do	1.72	6.6
June 1	W. E. Code	1.81	2.1				

Daily discharge, in second-feet, of Cave Creek canal near Paradise, Ariz., for the period Oct. 14, 1919, to Sept. 30, 1920

Day	Oct.	Nov.	Mar.	Apr.	May	June	Aug.	Sept.
1		1.4		1.6	6	2		2
2		1.4		1.6	6	2		2
3		1.4		2.6	6	2		2
4		1.4		2.6	7.9	2		2
5		1.4		2.6	7.9	2		2
6		.7		3.9	7.9	1.1		2
7		.7		4.6	7.9	1.1		1.5
8		.7		6.2	7.9	1.1		1.5
9		.7		6.2	7.9	1.1		1.1
10		.7		6.2	8.8	1.1		1.1
11		.7		6.2	8.8	1.1		.5
12		.7		6.2	8.8	1.1		.5
13		.7		6.2	8.8	2		2
14	0.9	.7		6.2	8.8	2		
15	.9	.7		6.2	8.8	1.6		
16	.9			6.2	6.8	1.1		1.1
17	1.9			2.0	6.8	.3		.5
18	1.9			2.5	6.8			
19	1.9			2.5	6.8			.2
20	2.4			2.5	6.8		0.5	.2
21	2.4			5.3	7.6		2	.2
22	2.4			5.3	7.6		4.6	
23	2.4		2.4	5.3	4.2		3.9	
24	1.4		.7	5.3	4.2		6.2	
25	1.4		1.4	5.3	4.2		7.1	
26	1.4		1.4	5.3	4.2		6.2	
27	1.4		1.6	5.3	4.2		6.2	
28	1.4		1.6	5.3	4.2		6.2	
29	1.4		1.6	6	4.2		4.6	
30	1.4		1.6	6	1.8		4.6	
31	1.4		1.6		1.8		4.6	

NOTE.—Only a trace of water Nov. 16–22, June 18 and 19. Canal dry Nov. 23 to Mar. 22, June 20 to Ap 10, Sept. 14, 15, 18, and 22–30.

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Monthly discharge of Cave Creek canal near Paradise, Ariz., for the period Oct. 14, 1919, to Sept. 30, 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October 14–31			1.62	58
November	1.4	0	.47	28
March	2.4	0	.46	28
April	6.2	1.6	4.64	276
May	8.8	1.8	6.46	397
June	2	0	.82	49
August	7.1	0	1.83	112
September	2	0	.69	41
The period				990

EAST TURKEY CREEK AT PARADISE, ARIZ.

LOCATION.—In SW. ¼ sec. 19, T. 17 S., R. 31 E., at Paradise, Cochise County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 4, 1919, to September 30, 1920.

GAGE.—Vertical enamel staff on right bank 300 feet downstream from post office; read by John Hancock.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Bed composed of boulders and gravel. Control formed by concrete wall extending across section and diagonally downstream 100 feet with 2-foot drop. Channel fairly uniform in cross section.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge for the period August 4, 1919, to September 30, 1920, 130 second-feet November 22; minimum, no flow for long period.

DIVERSION.—Several small diversions above station, but most of the water returns to creek above station.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curves fairly well defined between 0 and 20 second-feet, poorly defined above. Gage read to hundredths once daily and oftener during flood periods. Daily discharge ascertained by applying mean daily gage height to rating tables, and by hydrograph for flood periods, except for periods August 10–16, 21–31, September 1–6, 8–30, October 1–4, 11, 13–31, November 1–21, 1919, June 16–20, July 7–9, 11–23, 30, 31, August 1, 3–31, and September 1–30, 1920, when there was a trace of water only, and October 5–10, 1919, and August 2, 1920, when stream was dry. Records fair.

COOPERATION.—Discharge measurements and record of daily discharge furnished by University of Arizona. Prof. G. E. P. Smith, irrigation engineer.

Discharge measurements of East Turkey Creek at Paradise, Ariz., during the period August 4, 1919, to September 30, 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Aug. 4	Schwalen and Kunesh	0.58	0.65	Mar. 3	H. C. Schwalen	0.57	3.24
26	H. C. Schwalen	.50	.02	May 31	G. E. P. Smith	.40	.86
Feb. 11	do	.68	8.2	Aug. 25	Smith and Schwalen	.40	.15

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Daily discharge, in second-feet, of East Turkey Creek at Paradise, Ariz., for the period August 4, 1919, to September 30, 1920

Day	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
1					8	1	2.5	3.5	3.5	4	1	0.5
2					5.5	1	2.5	3.5	3.5	3.5	1	.5
3					5.5	1	2	3.5	3.5	3.5	1	.5
4	0.5				5.5	2	2	3	3.5	3.5	1.5	.5
5	.5				5.5	1.5	2	3	3.5	3.5	1.5	.5
6	.5				5.5	1.5	2	3	3.5	3.5	1.5	.5
7	.5	1.5			4.5	2	3	2.5	3.5	3.5	1.5	
8	.5				4.5	2	5	2.5	3.5	3	.5	
9	.5				4	1.5	17	3	3.5	3	.5	
10					3.5	1.5	12	3	3.5	3	.5	.5
11					3	1.5	10	3	3.5	3	1	
12			3		2.5	1.5	7	2.5	3.5	2.5	2	
13					2	2	6	2.5	3	2.5	2	
14					2	2	5	2	2.5	2.5	1	
15					2	2	3.5	2	3	2.5	.5	
16					2	4.0	3.5	2.5	3	2		
17	4.5				1.5	7	3.5	2	4.5	2		
18	.5				1.5	7	3	2	4.5	2		
19	.5				1.5	7.5	2.5	2	4.5	2		
20	.5				1.5	13	21	2	5	1.5		
21					1.5	7.5	12	2	4	2	.5	
22				130	1.5	6.5	10	2	5	2	.5	
23				75	1.5	5.5	8.5	2	5	2	.5	
24				33	1.5	4	9	3	5.5	1.5	.5	.5
25				13	1.5	4	7.5	6	5.5	2	.5	.5
26				9	1.5	3.5	6	3.5	5.5	1.5	1	.5
27				7	1.5	3	5	4	4.5	1.5	.5	.5
28				7	1	8	4	3.5	4	1.5	.5	.5
29				10	1	2.5	3.5	3.5	4	1.5	.5	.5
30				10	1	2.5		3.5	4	1.5	.5	
31					1	2.5		3.5		1		

NOTE.—See "accuracy" paragraph.

Monthly discharge of East Turkey Creek at Paradise, Ariz., for the period August 4, 1919, to September 30, 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
August 4-31	4.5		0.32	18
September	1.5		.05	3
The period				21
1919-20				
October	3	0	.10	6
November	130		9.8	583
December	8	1	2.77	170
January	13	1	3.45	212
February	21	2	6.22	357
March	4	2	2.89	178
April	5.5	2.5	3.97	236
May	4	1	2.40	148
June	2		.75	45
July	5		.21	13
The year	130	0	2.68	1,950

SAN PEDRO RIVER NEAR FAIRBANK, ARIZ.

LOCATION.—Opposite Boquillas Land & Cattle Co.'s ranch house, 1½ miles southeast of Fairbank, Cochise County, and 3 miles below old Charleston mill.

DRAINAGE AREA.—Not measured.

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Records available.—September 28, 1912, to September 30, 1920. January 27, 1904, to August 31, 1906, and October 8, 1910, to November 15, 1911, for station at Charleston; November 15, 1911, to September 28, 1912, for station at diversion dam of Boquillas Land & Cattle Co.

Gage.—Vertical and inclined staff on right bank; read by J. M. Barnes. For description of previous gages used at this station, see Water-Supply Paper 479, p. 154.

Discharge measurements.—Made from cable 600 feet downstream from gage or by wading.

Channel and control.—Bed composed of sand and gravel; shifting. Both banks steep in vicinity of gage and cable, channel fairly straight with considerable fall. At low stages channel bears away from gage and a ditch has to be maintained from gage to river.

Extremes of discharge.—Maximum stage during year ending September 30, 1919, 10.3 feet at noon August 16 (discharge, 25,100 second-feet, from extension of rating curve); minimum stage, −0.25 foot June 23 to 30 (discharge, 1 second-foot).

Maximum stage during year ending September 30, 1920, 3.9 feet at 2.30 p. m. September 5 (discharge, 3,100 second-feet); minimum stage, −0.97 foot September 4 (discharge, 2 second-feet).

1912–1920: Maximum stage recorded, 16.0 feet at 5 p. m. December 22, 1915 (discharge not determined); minimum discharge, 1 second-foot, occurred on June 13–14, September 26–28, 1918, and June 23–30, 1919.

Diversions.—Boquillas Land & Cattle Co. divert water at various points above station for irrigation. Total area irrigated not known.

Accuracy.—Stage-discharge relation not permanent. Shifting-control method used October 1, 1918, to June 30, 1919, January 17–31, 1920, and March 26, 1920, to May 7, 1920. Rating curves used from July 1, 1919, to September 30, 1919, poorly defined. Curve used October 1, 1919, to January 16, 1920, and May 8 to September 30, 1920, well defined below 400 second-feet; and curve used February 1 to March 25, 1920, poorly defined. Gage read to half-tenths once daily; oftener during high-water periods. Daily discharge ascertained by applying mean daily gage height to rating table, except when shifting-control method was used and as indicated in footnote to daily-discharge table. During high-water periods of July and August, 1919, mean daily discharge was determined by averaging hourly discharges corresponding to frequent gage readings. Records fair.

Discharge measurements of San Pedro River near Fairbank, Ariz., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1918		*Feet*	*Sec.-ft.*	1919		*Feet*	*Sec.-ft.*
Oct. 22	C. E. Ellsworth	0.05	6.6	Aug. 23	Schwalen and Holle	−0.10	36.2
1919				Sept. 9	Schwalen and Code	0	32
Jan. 9	J. F. Kunesh	.08	20	Nov. 20	H. C. Schwalen	−.40	19
9	do	.08	21	1920			
16	J. M. Barnes	0	12	Jan. 9	Kunesh and Schwalen	−.08	69
Feb. 23	do	0	13	16	J. F. Kunesh	+.61	308
Mar. 21	do	−.15	3.2	Feb. 23	Smith and Schwalen	−.42	32
Apr. 23	do	−.15	3.3	May 7	Schwalen and Code	−.65	6.7
May 22	J. F. Kunesh	−.16	3.6	June 6	W. E. Code	−.76	5.4
June 22	J. M. Barnes	−.25	1.3	28	H. C. Schwalen	−.67	2.4
July 20	J. F. Kunesh	.08	59	Sept. 17	C. W. Sopp	−.15	60
Aug. 8	Kunesh and Schwalen	.70	58				

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Daily discharge, in second-feet, of San Pedro River near Fairbank, Ariz., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	2	5	16	20	16	12	7	3	2	648	717	400
2	2	5	16	20	16	12	3	3	2	334	1,000	400
3	2	5	16	20	12	12	3	3	2	1,360	1,080	400
4	2	5	16	20	12	12	3	3	2	660	283	400
5	2	5	16	20	12	12	3	3	2	1,590	133	400
6	2	5	16	20	12	12	5	3	2	1,850	92	400
7	2	5	16	20	12	12	5	3	2	1,070	82	210
8	25	5	16	20	12	12	7	3	2	418	64	125
9	25	5	16	16	12	12	7	3	2	240	53	80
10	25	10	16	12	12	12	7	3	2	177	118	100
11	25	16	16	12	12	12	10	10	2	207	148	400
12	25	12	16	12	12	12	5	5	2	307	356	1,350
13	25	12	16	12	12	12	3	3	2	333	306	369
14	25	12	16	12	12	12	3	3	2	2,400	870	240
15	25	12	16	12	12	12	3	3	2	6,050	970	100
16	25	12	16	12	12	12	3	3	2	818	4,400	100
17	25	12	16	12	12	7	3	3	2	820		80
18	25	12	16	12	12	7	3	3	2	418		100
19	25	12	16	16	12	7	3	3	2	102		125
20	105	12	16	16	12	5	3	3	2	59	350	125
21	7	12	20	16	12	3	3	3	2	65		125
22	7	12	41	16	12	3	3	3	2	47		100
23	7	12	56	16	12	3	3	5	1	34	34	100
24	7	12	56	16	12	3	3	3	1	34		100
25	5	12	41	16	12	3	3	3	1	31		150
26	5	12	36	16	12	3	3	2	1	27		100
27	5	12	30	16	12	3	3	2	1	34	350	100
28	5	12	25	16	12	3	3	2	1	1,040		100
29	5	12	20	14	------	3	3	2	1	207		100
30	5	12	20	14	------	3	3	2	1	91		100
31	5	------	20	12	------	3	------	2	------	307		------
1919–20												
1	108		250	38	63	38	30	11	8.5	5	152	3
2	84		205	38	54	38	30	10	8	4.5	370	3
3	84		170	38	54	37	28	9	680	4.5	435	3
4	84		170	41	54	39	28	11	8.5	4.5	278	2
5	84		126	205	51	38	28	10	8	4.5	57	360
6	84		108	108	51	38	20	9	7.5	4.5	32	122
7	84		84	84	51	39	20	8	5.5	4	27	57
8			74	74	54	42	18	8.5	5	4	19	13
9			65	65	54	40	22	8.5	5	3.5	8.5	10
10		30	65	65	54	39	19	8.5	5	3.5	54	5.5
11			57	65	54	42	19	8.5	5	3.5	158	4.5
12			49	65	54	42	22	8.5	5	4	84	4.5
13			41	74	54	42	18	8.5	4.5	3.5	510	4.5
14			41	84	54	39	18	8.5	11	3.5	188	4
15			41	500	51	39	15	8.5	7.5	3.5	74	6.5
16			41	324	51	38	15	8.5		3.5	24	4.5
17			49	240	51	37	13	8.5		3.5	12	122
18			49	215	51	36	13	8.5		3.5	8	15
19			47	240	51	35	13	8.5		9	98	5.5
20	50	24	45	260	46	34	14	8		3	126	5.5
21		24	43	180	46	34	16	7	7.5	3	49	5.5
22		307	41	145	54	34	16	7		6.5	34	24
23		590	41	126	54	31	16	7		49	22	7
24		492	41	98	46	34	15	7		13	13	4.5
25		590	41	85	46	39	11	8.5		9	10	4.5
26		228	41	98	42	60	11	8.5		7	7	4
27		108	41	88	42	50	11	8.5		250	5.5	4
28		228	41	76	42	44	14	8.5	7.5	13	4	4
29		510	41	74	39	44	14	8.5	122	12	4	4
30		260	41	74	------	41	14	8.5	5.5	11	3.5	3.5
31		------	38	67	------	36	------	8.5	------	7.5	3.5	------

NOTE.—No gage readings Oct. 17, 1918, Feb. 24, Mar. 28, Apr. 15, May 17, Sept. 20, Nov. 22, Dec. 19–21, 1919, Feb. 11, Mar. 9, 15–19, 1920, discharge interpolated; no gage readings Oct. 7, 8, 19, 1918, and May 20, 1920; discharge estimated. Braced figures indicate estimated daily discharge for periods indicated for which no gage record was secured.

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Monthly discharge of San Pedro River near Fairbank, Ariz., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	105	2	15.5	953
November	16	5	10.0	595
December	56	16	22.1	1,360
January	20	12	15.6	959
February	16	12	12.3	683
March	12	3	8.1	498
April	10	3	4.0	238
May	10	2	3.2	197
June	2	1	1.7	101
July	6,050	27	703	43,200
August	4,400	34	503	30,900
September	1,350	80	232	13,800
The year	6,050	1	129	93,500
1919–20				
October	108	----------	58.5	3,600
November	590	----------	128	7,620
December	250	38	72.2	4,440
January	590	38	130	7,990
February	63	39	50.6	2,910
March	60	31	39.3	2,420
April	30	11	18.0	1,070
May	11	7	8.56	526
June	680	4.5	33.3	1,980
July	250	3.5	15.0	922
August	510	3.5	92.8	5,710
September	860	2	44	2,620
The year	860	2	57.5	41,800

ARAVAIPA CREEK NEAR FELDMAN, ARIZ.

LOCATION.—In sec. 9, T. 7 S., R. 16 E., at concrete ford on Oracle-Winkleman highway, a quarter of a mile above junction with San Pedro River, 2½ miles south of Feldman, and 12 miles by road south of Winkleman, Pinal County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 21, 1919, to September 30, 1920.

GAGE.—Painted on downstream side of concrete ford from 1.0 to 3.0 feet, and on county ford markers, vertical pipes at each end, from 3.0 to 8.0 feet. Gage read by Della E. Barker.

DISCHARGE MEASUREMENTS.—Made by wading or by floats when stream is above wading stage.

CHANNEL AND CONTROL.—Concrete ford is artificial control on a channel composed of gravel and boulders. High water deposits sand and gravel on ford, which affect sensitiveness of control. Velocities are swift over the ford. Banks are high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the period April 21, 1919, to September 30, 1919, 6.3 feet on August 2 (discharge, 20,000 second-feet, from extension of rating curve); minimum discharge, zero flow during long periods.

Maximum stage recorded during year ending September 30, 1920, 4.05 feet at midnight December 4 (discharge, 7,400 second-feet, from extension of rating curve); minimum discharge, zero flow, during long periods.

1919–1920: Maximum that of August 2, 1919; minimum, no flow, during long periods each year.

DIVERSIONS.—Approximately 2,000 acres irrigated above station.

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ACCURACY.—Stage-discharge relation permanent except when affected by shifting gravel deposits on concrete ford. Extent of shifting not known, as sufficient discharge measurements were not obtained. Several rating curves used applicable for short periods of low stage and merging into a standard curve poorly defined above 500 second-feet. This curve extended into high stages by aid of float measurements and area and mean velocity study. Gage read to quarter-tenths daily and oftener during periods of fluctuating stage. Daily discharge ascertained by applying mean daily gage height to rating table or by averaging hourly discharges for days when stage fluctuated rapidly. Records poor.

Discharge measurements of Aravaipa Creek near Feldman, Ariz., during the period Apr. 21, 1919, to Sept. 30, 1920

[Made by J. F. Kunesh]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
1919	*Feet*	*Sec.-feet*	1919	*Feet*	*Sec.-feet*	1920	*Feet*	*Sec.-feet*
July 3	1.38	24.8	July 15	2.03	718	Feb. 9	1.91	304
7	1.20	7.6	Aug. 20	1.19	10.3	9	1.93	356
8	1.33	29.9	Dec. 9	1.25	12.6	24	1.19	6.7
15	3.50	a5,080				Mar. 18	1.05	.05
15	3.10	a3,460	1920					
15	2.85	a2,250	Jan. 22	1.19	2.8			
15	2.62	a1,820	23	1.09	.7			

a Float measurement.

Daily discharge, in second-feet, of Aravaipa Creek near Feldman, Ariz., for the period Apr. 21, 1919, to Sept. 30, 1920

Day	July	Aug.	Sept.	Day	July	Aug.	Sept.	Day	July	Aug.	Sept.
1919				1919				1919			
1		307	5	11	18		14	21	500		
2	280	1,690		12	88		14	22	265		
3	380	785		13	63		20	23			
4	488	18		14	83		14	24			
5	658	2		15	708		14	25			
6	658			16	27		14	26		46	8
7	20		5	17	693		12	27	1	14	562
8	20		14	18	14		5	28	3		1
9	298	6	27	19	5		2	29	1		
10	42		14	20	3	7		30	1		
								31	1		

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Daily discharge, in second-feet, of Aravaipa Creek near Feldman, Ariz., for the period Apr. 21, 1919, to Sept. 30, 1920—Continued

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	June	July	Aug.	Sept.
1919-20										
1		7				14				
2		3				14				85
3		2								7
4		1	202							
5		2,570	23							55
6		202	17							50
7		23	11							27
8		10	17	16						27
9		14	4	305						27
10		2		450					20	
11				450	23				2	
12			11	68	8				60	
13			4	28	2				515	
14			14	9					14	
15			28	4					14	
16			11	3					14	265
17			4						7	200
18										27
19			4						60	
20			31						14	
21			23	238					14	
22			9	27						
23	155		2	11				55		
24	74			8	152			14	200	
25	14			4	47		2		340	
26	1				31				50	
27	0				45				14	
28	83				40				7	
29	14				31		31			
30	5				18					
31					9					

NOTE.—Stream was dry Apr. 21 to July 1, 1919, Oct. 1-31, 1919, May 1-31, 1920, and on other days for which no discharge is given.

Monthly discharge of Aravaipa Creek near Feldman, Ariz., for the period Apr. 21, 1919, to Sept. 30, 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
July	708	0	170	10,500
August	1,690	0	92.7	5,700
September	563	0	24.8	1,490
The period				17,700
1919-20				
November	155	0	11.5	684
December	2,570	0	91.4	5,440
January	202	0	13.4	824
February	450	0	55.7	3,200
March	152	0	13.1	805
April	14	0	.93	55
June	31	0	1.1	65
July	55	0	2.22	137
August	515	0	43.4	2,670
September	265	0	25.9	1,540
The year	2,570	0	21.5	15,400

NOTE.—No flow during months for which no discharge is given.

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QUEEN CREEK NEAR SUPERIOR, ARIZ.

LOCATION.—1 mile below dam site near Whitlow's ranch and 12 miles below Superior, Pinal County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—February 14, 1915, to September 30, 1920, when station was discontinued. A station was operated at Whitlow's ranch during 1896 and fragmentary records of stage and flood occurrence kept during 1897 to 1899. Total run-off, January, 1896, to August 11, 1899, published in Twenty-First Annual Report, Part IV.

GAGE.—Inclined staff on left bank 1 mile below dam site, installed September 15, 1916; read by Hart Mullins. For previous gages used at this station see Water-Supply Papers 479 (p. 156) and 459.

DISCHARGE MEASUREMENTS.—Made from cable at dam site or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel which is constantly shifting. Stream is very flashy and is usually dry soon after each rise.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 11.0 feet at 1.30 p. m. August 1 (discharge about 10,000 second-feet); channel dry for long periods during year.

Maximum stage recorded during year ending September 30, 1920, 4.5 feet during night of February 20-21 (discharge, 750 second-feet); channel dry for long periods during year. Floods with considerable discharge have occurred during previous years, but no reliable record is available showing maximum stage or discharge. Channel at present gage is dry for considerable period each year; at dam site 1 mile above present gage, discharge seldom, if ever, is less than about 1 second-foot.

DIVERSIONS.—Water diverted above gage to irrigate a few acres; amount unknown.

ACCURACY.—Stage-discharge relation not permanent. Rating curves poorly defined. Gage read to half-tenths twice daily. Daily discharge not accurate enough to publish. Monthly estimates poor but show the deficiency of water.

Discharge measurements of Queen Creek near Superior, Ariz., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1918		*Feet*	*Sec.-ft.*	1919		*Feet*	*Sec.-ft.*
Oct. 20	Hart Mullins	1.1	29.5	July 22	Hart Mullins	1.2	1.2
Nov. 14	do	1.55	90	Aug. 2	do	.6	6.3
24	Kunesh and Mullins	2.0	545	Sept. 4	J. F. Kunesh	.0	1.1
25	Hart Mullins	1.5	44	18	Hart Mullins	.65	.85
Dec. 6	J. F. Kunesh		0	Oct. 11	do	.6	.33
8	Hart Mullins	1.3	17	31	do	.6	.1
22	do	1.5	33	Nov. 28	do	.6	3.0
23	do	1.5	30	Dec. 6	do	1.3	5.3
24	do	1.3	21	13	do	1.5	2.5
25	do	.9	3.9				
28	do	.9	2.2				
30	do	.9	2.0	1920			
31	do	1.6	66	Jan. 10	do	2.3	14.5
				12	do	2.3	43.2
1919				31	do	1.55	3.7
Jan. 2	do	.8	5.4	Feb. 4	J. F. Kunesh	1.53	4.0
2	do	.9	11	Mar. 15	do	1.66	9.3
5	do	.8	2.8	30	Hart Mullins	2.15	39.0
Feb. 4	do	1.7	56	July 12	J. F. Kunesh	1.56	.3
15	do	1.7	28	Aug. 13	Hart Mullins	1.7	1.4
20	do	1.9	56	14	do	1.7	.97
22	do	2.0	64	17	do	1.35	3.0
Mar. 20	J. F. Kunesh	1.1	6.3	20	do	1.12	4.1
June 1	Hart Mullins	1.0	.6	25	do	1.4	27.0
July 12	do	.65	8	Sept. 17	do	.9	.83
18	do	1.2	3.3	18	do	1.1	2.9
				19	do	1.0	.51

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Monthly discharge of Queen Creek near Superior, Ariz., for the years ending Sept. 30, 1919 and 1920

Month	Mean discharge in second-feet	Run-off in acre-feet	Month	Mean discharge in second-feet	Run-off in acre-feet
1918-19			1919-20		
October	0.7	43	October	.32	20
November	5.1	303	November	1.19	71
December	9.76	600	December	16.2	996
January	2.7	166	January	32.3	2,000
February	51.5	2,860	February	41.4	2,300
March	7.2	443	March	19.3	1,190
April	4.4	262	April	13.5	802
May	2.1	129	May	6.9	424
June	.27	16	June	4.9	292
July	8.85	544	July	.36	22
August	25.5	1,570	August	2.88	177
September	4.11	245	September	.04	2
The year	9.93	7,180	The year	11.6	8,430

SANTA CRUZ RIVER NEAR NOGALES, ARIZ.

LOCATION.—In SW. ¼ sec. 36, T. 23, S., R. 14 E., just below proposed dam site at Yerba Buena ranch, half a mile above pumping plant for city of Nogales, and 7 miles northeast of Nogales, Santa Cruz County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 22 to November 30, 1907, and April 1, 1909 to September 30, 1920 (incomplete).

GAGE.—Richard Freres' water-stage recorder on left bank about half a mile above city pumping plant, installed January 3, 1916; inspected by W. W. Coons. For description of previous gages used at this station, see Water-Supply Paper 479, p. 157.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel, which is constantly shifting. No well-defined control. Channel is wide and shallow with low banks.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, 3.85 feet at 7 p. m. August 6 (discharge, 785 second-feet); channel dry for long periods during year.

Maximum stage during year ending September 30, 1920, 3.5 feet at noon, January 4 (discharge, 580 second-feet); channel dry for long periods during year. No reliable record of maximum floods during previous years. Channel is usually dry during long periods of each year.

DIVERSIONS.—Water is diverted above station for irrigation of about 140 acres.

ACCURACY.—Stage-discharge relation continually changing. Standard rating curves used with shifting control method defined by discharge measurements secured frequently during 1919 and 1920. These determined the changes in stage-discharge relation with fair accuracy for low stages. Changes during high stages not well defined. Water-stage recorder was not sensitive and gage heights are subject to errors as great as 0.05 foot at any time. Daily discharge ascertained by shifting-control method. Records fair for low stages and poor for high stages.

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Discharge measurements of Santa Cruz River near Nogales, Ariz., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft.*	1920		*Feet*	*Sec.-ft.*
Jan. 8	J. F. Kunesh	1.1	0	Jan. 23	W. W. Coons	2.41	38.2
Mar. 11	do	1.32	2.9	29	do	2.34	27.6
May 24	do	1.1	0	Feb. 6	do	2.32	22.6
July 2	W. W. Coons	1.8	49	13	do	2.32	29.5
18	do	2.0	57	20	do	2.31	19.7
19	J. F. Kunesh	1.93	47	26	do	2.26	15.3
20	do	1.87	33	Mar. 5	do	2.22	16.7
25	W. W. Coons	1.7	8.0	12	do	2.21	8.7
Aug. 10	Kunesh and Schwalen	2.08	65	19	do	2.18	4.6
15	W. W. Coons	1.92	25	26	do	2.25	11.8
22	do	1.74	2.8	Apr. 2	do	2.20	6.8
29	do	1.98	41	9	do	2.10	2.2
Sept. 5	do	1.85	17	16	do	2.12	3.7
Oct. 3	do	1.9	7.8	23	do	2.18	5.3
10	do	1.93	6.4	30	do	2.10	1.8
17	do	2.00	9.3	May 7	do	2.05	1.7
24	do	1.98	11.0	14	do	2.05	1.2
31	do	2.00	11.4	21	do	2.02	1.1
Nov. 7	do	1.99	9.2	July 23	do	2.30	7.4
14	do	2.00	10.5	27	do	2.64	10
21	do	1.99	12.5	30	do	2.00	3.3
Dec. 5	do	2.30	73	Aug. 1	do	2.45	12
12	do	2.20	40.4	6	do	1.95	11
20	do	2.18	26.2	11	do	2.40	89
27	do	2.12	15.2	13	do	2.25	35
				18	do	2.66	125
1920				24	do	2.56	15
Jan. 2	do	2.13	11.6	27	do	1.93	9.2
8	Kunesh and Schwalen	2.44	121	31	Coons and Code	1.82	2.2
16	W. W. Coons	2.54	152	Sept. 16	C. W. Sopp	1.85	4.8

Daily discharge, in second-feet, of Santa Cruz River near Nogales, Ariz., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1					16	6	1			34	250	37
2					25	6	1			45	150	32
3					25	6	1			23	180	29
4					22	2	1			49	150	22
5					19	2	1			179	156	17
6					17	2	1			84	234	20
7					17	2	1			95	150	43
8					16	3	1			133	133	208
9					14	3	1			48	88	130
10					13	3	1			126	66	88
11					11	3	2			182	48	65
12					12	3	2			35	55	94
13					11	3	2			3	61	88
14					11	2	1			135	32	73
15					9	2	1			205	25	46
16				2	9	2	1			150	25	29
17				3	9	2	1			128	50	25
18				3	9	2	1			68	25	22
19				4	9	2	1			59	16	18
20				5	9	2	1			34	12	14
21				4	9	1	1			26	8	12
22				3	9	1	1			21	4	10
23				3	8	1	1			20	3	8
24				2	8	1	1			13	2	8
25				2	7	1	.8			8	46	8
26				2	7	1	.7			8	70	18
27				2	7	1	.4			14	92	29
28				3	6	2	.5			26	68	27
29				7		2	.4			15	87	21
30				8		1	.5			14	90	17
31				9		1				215	48	

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Daily discharge, in second-feet, of Santa Cruz River near Nogales, Ariz., for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919-20												
1	14	14	110	8	25	12	7	2	0.5			
2	10	12	160	19	23	10	7	2	.5			
3	8	10	88	10	23	10	7	2				
4	8	10	82	269	25	13	7	1				
5	6	10	76	268	23	16	6	1	2			
6	4	10	68	144	22	14	5	1	1			
7	4	10	60	120	22	13	4	1				
8	5	10	57	120	23	10	3	1				
9	5	11	49	113	23	8	2	1				
10	5	11	46	110	25	8	3	1				
11	8	10	44	120	30	9	1	1				
12	14	10	40	162	30	10	.8	1				
13	15	10	42	151	32	8	1	1	64			
14	14	10	33	199	34	6	2	1	25			
15	10	10	29	214	27	7	5	1				
16	7	10	29	159	27	6	4	1				
17	8	9	31	71	23	6	3	1				
18	10	10	33	66	20	6	4	1				
19	10	11	27	63	22	4	4	1				
20	10	14	25	60	20	4	5	1				
21	11	12	22	53	20	4	6	1				
22	14	19	19	46	19	4	6	1				
23	14	36	18	39	16	4	7	1				
24	11	33	15	39	16	8	6	1				
25	11	25	17	34	18	14	6	1				
26	11	21	15	32	18	12	5	1				
27	10	22	15	32	16	12	6	1				
28	11	141	12	30	15	10	5	1				
29	11	97	10	28	13	10	4	1				
30	14	117	9	27		12	2	1				
31	15		9	27		8		1				

NOTE.—No flow Oct. 1, 1918, to Jan. 15, 1919, May 1 to June 30, 1919, June 3, 4, 7-12, 15-30, 1920. Record for July 1 to Sept. 30, 1920, very meager and not accurate enough to publish. Probably not much flow.

Monthly discharge of Santa Cruz River near Nogales, Ariz., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
January	9	0	2.0	123
February	25	6	12.3	683
March	6	1	2.3	141
April	2	.4	1.01	60.1
July	295	3	73.7	4,530
August	250	2	78.2	4,810
September	298	8	44.9	2,670
The year	298	0	18.0	13,000
1919-20				
October	15	4	9.9	609
November	141	9	24.5	1,460
December	110	9	39.7	2,440
January	269	8	89.5	5,500
February	34	13	22.4	1,290
March	16	4	9.0	553
April	7	.8	4.46	265
May	2	1	1.1	68
June	64	0	3.1	184
The period	269	0		12,400

ee footnote to table of daily discharge.

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SANTA CRUZ RIVER AT TUCSON, ARIZ.

LOCATION.—In sec. 14. T. 14 S., R. 13 E., at Congress Street Bridge in Tucson, Pima County. Rillito Creek enters 7 miles downstream.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 15, 1905, to September 30, 1920 (incomplete).

GAGE.—Staff gages painted on downstream side of each bridge abutment. Original gage was painted on bridge pier on left bank. During 1911 and up to September 30, 1912, gage heights were observed from temporary staff or by measuring to the water surface from a reference point on bridge. October 1, 1912, to July 7, 1913, a chain gage installed on bridge was used. Original datum was maintained until November 22, 1913, when it was lowered 2 feet. From December 12, 1914, to September 7, 1916, gage heights were obtained from a reference point at an elevation of 19.28 feet above new datum. During January flood the bridge settled, lowering the reference point to 16.73 feet above datum. During the summer of 1916 a new bridge was constructed and a staff gage was installed September 7 on one of the piers at a different datum. Since then, additional painted gages, set to same datum have been used to facilitate observations when river flows in several channels past the bridge. Observer, J. O. Kenny.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Sand; wide and shallow; shifts badly at all stages.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year ending September 30, 1919, about 1 a. m. August 2, 4,700 second-feet, from hydrograph. Maximum discharge recorded during year ending September 30, 1920, at about 3 a. m., August 9, 1,950 second-feet, from hydrograph. Stream is dry most of each year at this point.

1905–1920: Maximum stage recorded, 9.8 feet December 24, 1914 (discharge, approximately 9,000 second-feet, probably the maximum discharge ever recorded). No flow part of each year.

DIVERSIONS.—Small diversions above the station for irrigation, amounts unknown.

ACCURACY.—Stage-discharge relation not permanent. Loose sand channel and control continually changing. Gage read to tenths several times daily during flow periods. Daily discharge computed by hydrograph method. Records fair. During part of each winter for a period of one or two months usually from 2 to 6 second-feet, which is not measured, flows past the gage. This is waste from irrigation ditch that enters the river about one-quarter of a mile upstream.

COOPERATION.—Daily discharge record furnished by University of Arizona through G. E. P. Smith, irrigation engineer.

Discharge measurements of Santa Cruz River at Tucson, Ariz., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1918		*Feet*	*Sec.-ft.*	1919		*Feet*	*Sec.-ft.*
Dec. 22	C. P. Wilson	4.85	78	Aug 16	Schwalen and Code	5.13	305
				Sept. 2	H. C. Schwalen	4.95	168
1919				8	Schwalen and Code	4.78	129
July 1	Kunesh and Schwalen	4.91	88	Nov. 25	H. C. Schwalen	4.60	6.4
2	do	6.08	1,570	Dec. 22	do	4.50	3.9
2	H. C. Schwalen	4.90	279				
3	do	4.85	114	1920			
7	do	4.70	121	Jan. 5	Schwalen and Code	5.26	536
8	do	5.32	606	6	do	5.00	233
10	do	5.15	336	Feb. 5	H. C. Schwalen	4.75	6.8
11	do	7.28	2,200	20	do	4.50	11
15	do	5.75	980	Mar. 20	W. E. Code	4.67	8.1
16	Schwalen and Code	6.20	1,150	Aug. 2	do	4.00	4.6
27	H. C. Schwalen	4.90	157	Sept. 6	do	5.40	704
Aug. 2	W. E. Code	6.80	2,630	6	do	4.95	109
8	do	4.50	24				

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Daily discharge, in second-feet, of Santa Cruz River at Tucson, Ariz., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Dec.	July	Aug.	Sept.	Day	Oct.	Dec.	July	Aug.	Sept.
1918–19						1918–19					
1			319	916	136	16			927		
2			244	2,750		17			906		
3			148	480		18			214		
4			17	73		19				166	
5			511	25		20	11			270	
6			648	137		21					
7			739	25	142	22		31			
8			1,060	103	378	23		8			
9			16		318	24					
10			344			25					
11			1,030			26					88
12			52			27			94		32
13			3			28			78		
14						29			2	3	
15			395			30				2	
						31					

Day	Nov.	Dec.	Jan.	Feb.	June	July	Aug.	Sept.
1919–20								
1		25	10				10	
2		15	8				8	
3		15	7				100	
4		15	125	30			3	
5		15	650	16				60
6		15	180	16				285
7		10	80	16				
8		10	50	16				
9		10	50	16			420	
10		10	45				3	
11		6	45					
12		6	50		5		3	
13		6	70				40	
14		6	50				10	
15		6	200				5	
16		6	190					
17		5	70				2	
18		5	12				90	
19		4	8				35	
20		4	10	11			190	
21		4	8				3	
22		4	10					
23		4	12			150		
24	4	4	12			80		
25	53	4	12					
26	6	4	16					
27	6	5	16					
28	35	5						
29	53	4						
30	28	4						
31		4						

NOTE.—Stream reported dry on days of no record.

Monthly discharge of Santa Cruz River at Tucson, Ariz., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	11	0	0.4	25
December	31	0	1.3	80
July	1,060	0	250	15,400
August	2,750	0	160	9,840
September	378	0	36.5	2,170
The year	2,750	0	37.9	27,500

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Monthly discharge of Santa Cruz River at Tucson, Ariz., for the years ending Sept. 30, 1919 and 1920—Continued

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919-20				
November	85	0	7.8	464
December	25	4	7.7	473
January	550	0	61.2	3,760
February	30	0	4.2	242
June	5	0	.2	12
July	150	0	7.4	455
August	420	0	29.7	1,830
September	285	0	11.5	684
The year	550	0	10.9	7,920

NOTE.—Monthly discharge computed by engineers of U. S. Geol. Survey from daily-discharge furnished by University of Arizona, through G. E. P. Smith, irrigation engineer. See "Accuracy" in station description.

RILLITO CREEK NEAR TUCSON, ARIZ.

LOCATION.—In sec. 23, T. 13 S., R. 13 E., at highway bridge on Oracle road 4 miles above confluence with Santa Cruz River and 4 miles north of Tucson, Pima County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 12, 1911, to September 30, 1920 (incomplete).

GAGE.—Staff gage painted on downstream side of right abutment, referred to as gage A. Additional painted gages as needed, set to same datum, are located on the several piers of the highway bridge to facilitate observations when river flows in several channels past the bridge. These are designated as gages B, C, D, E, and F starting from first pier from right abutment. The E gage was installed January 19, 1920. A Richard Freres' water-stage recorder attached to right abutment of bridge was used part of the time prior to July 21, 1916, when it was destroyed. Observer, Donald Hodgson.

DICHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of sand, which is constantly shifting.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year ending September 30, 1919, about 3 a. m. July 27, 9,250 second-feet, from hydrograph. Maximum discharge recorded during year ending September 30, 1920, about 4 a. m. February 21, 7,800 second-feet, from hydrograph. Stream is dry most of each year at this point.

1911-1920: Maximum mean daily discharge, about 16,000 second-feet on December 23, 1914 (no record of discharge at peak of flood). Stream dry greater part of each year.

DIVERSIONS.—Flood water is diverted for irrigation above station, amount unknown.

ACCURACY.—Stage-discharge not permanent. Loose sand channel and control continually changing. Gage read to tenths several times daily during flow periods. Daily discharge computed by hydrograph method. Records poor.

COOPERATION.—Daily-discharge record furnished by University of Arizona through G. E. P. Smith, irrigation engineer.

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Discharge measurements of Rillito Creek near Tucson, Ariz., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft.*	1919		*Feet*	*Sec.-ft.*
Jan. 14	J. F. Kunesh	[a] 3.47	1.5	July 15	H. C. Schwalen	[a] 5.35	2,310
Feb. 1	do		Dry.	28	W. E. Code	[a] 3.48	35
3	W. E. Code	[a] 3.75	19	Aug. 2	do	[a] 4.74	187
5	J. F. Kunesh	[a] 3.55	4.6	Nov. 25	Code and Schwalen	[a] 4.70	128
14	W. E. Code	[a] 3.74	18	28	W. E. Code	[a] 5.20	350
17	do	[a] 3.56	2.6	Dec. 9	J. F. Kunesh	[b] 4.75	21
21	do	[a] 3.94	23				
Mar. 17	do	[a] 3.72	6.6	1920			
24	do	[a] 3.74	9.2	Jan. 5	Code and Schwalen	[a] 5.60	890
Apr. 3	J. F. Kunesh	[a] 3.78	19	6	do	[a] 4.85	265
9	W. E. Code	[a] 4.25	67	19	W. E. Code	[c] 5.15	130
10	do	[a] 3.91	39	22	J. F. Kunesh	[c] 5.25	94
12	do	[a] 4.05	72	Feb. 10	W. E. Code	[c] 5.45	406
12	J. F. Kunesh	[a] 3.90	61	20	H. C. Schwalen	[a] 4.66	7.2
16	W. E. Code	[a] 3.59	6.7	21	Schwalen and Kunesh	[d] 6.15	2,360
July 2	H. C. Schwalen	[a] 3.92	204	23	J. F. Kunesh	[e] 5.32	370
3	Kunesh and Schwalen	[a] 3.58	80	Mar. 25	W. E. Code	[c] 5.10	202
8	H. C. Schwalen	[a] 4.08	53	29	do	[c] 5.05	138
11	do	[d] 5.07	1,200	Apr. 1	do	[a] 4.95	72

[a] A gage on right abutment.
[b] B gage, first pier from right abutment; no channel past A gage.
[c] E gage, fourth pier from right abutment.
[d] A gage read 5.75 feet.
[e] A gage read 5.22 feet.

Daily discharge, in second-feet, of Rillito Creek near Tucson, Ariz., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	July	Aug.	Sept.
1918-19										
1							27	188	524	116
2					6		27	1,150	581	
3					19		20	905	893	
4					16		15	77	58	
5					5		10	2,550		
6					1		5	32		
7					2			377		
8					27		15	164		
9					30		50			14
10					30		40	302		
11					30		21	1,910		
12					24		30	275		
13				1	32		27			
14				4	16		20	179		
15		1		1	4		15	1,690		
16					2	5	10	2,790		
17					6	14	2	1,170		
18					20			22		
19					22			53		
20	19				26					
21					29					
22			2		30					
23					28	6				
24		1			7	17				
25		2			3	15				
26					2	15			8	3
27						16		1,600		109
28						17		71		
29						18				
30						20			15	
31						23				

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Daily discharge, in second-feet, of Rillito Creek near Tucson, Ariz., for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	July	Aug.	Sept.
1919-20										
1			142			15	80		60	
2			138			1	60			
3			132			1	50			
4			126				40			
5			514	420		1	30			
6			244	305			15			15
7			40	325			3			
8			22	25			2			
9			15	10	375				3	
10			2	10	555				125	
11				5	420	50			50	
12				5	205	55			660	
13				5	85	30			25	
14				50	58	6			4	
15				140	40	1				
16				130	15	1				
17				130	6					
18				130	4				110	
19				130						
20				130	108					
21				120	2,450					
22		13		94	520					
23		106		20	400					
24		173		20	220	64				
25		108		15	150	230				
26		38		5	100	100				
27		23		5	55	135				
28		342		1	55	150				
29		125		1	50	115				
30		259				100				
31						95				

NOTE.—No flow except where discharge is given.

Monthly discharge of Rillito Creek near Tucson, Ariz., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	19	0	0.6	37
November	2	0	.1	6
December	2	0	.06	4
January	4	0	.2	12
February	32	0	14.9	826
March	23	0	5.4	332
April	50	0	11.1	660
July	2,790	0	500	30,700
August	893	0	67.1	4,130
September	116	0	7.8	464
The year	2,790	0	51.4	37,200
1919-20				
November	342	0	39.6	2,360
December	514	0	44.7	2,750
January	420	0	72.0	4,430
February	2,450	0	262	11,660
March	230	0	37.1	2,280
April	80	0	9.3	553
August	630	0	32.5	2,000
September	15	0	.5	30
The year	2,450	0	35.8	26,000

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SALT RIVER NEAR ROOSEVELT, ARIZ.

LOCATION.—At diversion dam for power canal, 10 miles above upper end of Roosevelt reservoir and 20 miles east of Roosevelt, Gila County.

DRAINAGE AREA.—4,222 square miles (measured by United States Bureau of Reclamation.

RECORDS AVAILABLE.—October 1, 1913, to September 30, 1920 (including all water diverted for the development of power but not flow of Tonto Creek); February 7, 1901, to December 9, 1907, at site of Roosevelt dam (including flow of Tonto Creek); 1910–1913, discharge at Roosevelt dam computed from records of flow into and out of the reservoir (representing natural flow of Salt River (including Tonto Creek and water diverted for the development of power).

GAGE.—Principal gage is vertical staff on left bank, bolted to concrete wall at head of canal. Temporary gages are used from time to time on account of the channel shifting away from the main gage.

DISCHARGE MEASUREMENTS.—Made from cable at dam site or by wading near dam site. Prior to January 19, 1916, when the dam was destroyed by flood, low-water measurements were made by wading below dam. Above wading stage, discharge was determined from elevation of water surface in reservoir, taking into account known outflow and computed inflow from other sources besides Salt River.

CHANNEL AND CONTROL.—Shifting sand and gravel. Prior to its destruction by flood on January 19, 1916, the dam formed a permanent control.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge during year ending September 30, 1919, 12,000 second-feet, July 19; minimum discharge, 154 second-feet, October 6 to 8.

Maximum mean daily discharge during year ending September 30, 1920, 56,000 second-feet, February 22; minimum discharge, 202 second-feet, July 22 and 26.

1913–1920: Maximum mean daily discharge, 79,200 second-feet, January 15, 1916; minimum discharge, 152 second-feet, September 25, 1918.

DIVERSIONS.—None.

ACCURACY.—Discharge measurements are made nearly every day when discharge is less than about 3,000 second-feet and the results should be excellent. For flow greater than 3,000 second-feet there are no facilities for making discharge measurements. Discharge determined from extension of rating curve and study of reservoir contents, and results are subject to considerable error. Periods July 13 to August 27, September 9 to 11, September 15 November 25, 1919, to May 26, 1920, computed from reservoir contents.

COOPERATION.—Daily-discharge records furnished by Salt River Valley Water Users' Association.

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Daily discharge, in second-feet, of Salt River near Roosevelt, Ariz., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	166	213	253	307	352	734	3,810	1,990	654	216	1,920	580
2	166	213	251	291	2,540	536	4,340	1,780	676	217	11,100	450
3	166	215	219	276	1,490	522	4,410	1,770	646	900	4,600	365
4	157	203	219	210	1,130	517	4,260	1,700	680	545	5,470	315
5	155	216	219	205	779	660	4,260	1,680	579	451	2,630	283
6	154	219	219	199	651	834	4,810	1,790	537	1,420	1,730	261
7	154	215	257	229	564	844	4,260	1,770	527	1,760	1,280	236
8	154	203	290	210	598	794	4,510	1,670	442	1,450	1,300	2,000
9	162	215	311	255	596	834	3,710	1,490	416	1,100	1,240	4,560
10	162	212	301	261	814	768	3,470	1,260	388	1,220	1,120	2,910
11	161	216	390	231	988	819	2,990	1,150	380	1,710	1,080	947
12	165	216	427	278	1,200	889	2,590	1,150	396	1,660	1,100	765
13	165	214	429	290	1,770	970	2,890	1,200	385	2,920	917	355
14	165	203	393	273	1,470	939	3,290	1,130	385	4,280	974	397
15	165	242	374	291	884	1,680	4,120	1,050	337	8,310	886	1,190
16	165	264	328	263	840	1,460	4,560	1,000	232	8,070	779	773
17	180	281	311	252	876	1,420	4,280	1,050	329	6,630	885	735
18	177	276	276	252	839	1,460	3,210	916	328	10,400	323	635
19	173	249	344	241	939	1,410	3,330	914	298	12,000	1,820	387
20	168	249	308	263	964	1,520	4,640	859	289	6,420	1,550	645
21	172	238	293	250	891	2,630	4,320	806	276	4,630	1,070	580
22	196	230	379	261	910	3,460	3,940	806	271	5,280	880	387
23	229	230	332	263	1,000	5,080	3,760	792	257	3,970	638	387
24	222	248	345	273	976	3,020	3,230	853	247	2,570	437	385
25	239	360	332	245	974	2,500	3,360	853	230	2,040	412	375
26	244	321	290	216	937	2,040	3,010	853	230	1,560	558	375
27	218	312	221	223	819	1,880	2,650	1,310	224	1,560	915	465
28	217	290	209	257	834	1,940	2,910	1,770	220	2,730	610	765
29	221	290	184	269	-------	2,460	2,550	1,680	220	2,850	610	747
30	221	261	210	275	-------	2,760	2,260	873	225	1,700	576	786
31	221	-------	285	252	-------	3,210	-------	805	-------	979	557	-------
1919–20												
1	751	385	3,450	766	1,630	3,610	3,740	1,860	1,040	442	390	277
2	625	368	3,470	710	1,270	3,816	2,880	2,120	970	387	374	270
3	390	361	2,850	736	1,410	2,920	2,270	2,170	850	350	369	268
4	355	368	2,310	2,070	1,410	2,040	2,120	2,600	700	335	450	475
5	625	323	21,200	12,300	1,550	1,410	2,130	2,150	700	318	342	298
6	525	318	50,600	8,180	1,230	975	1,920	2,260	700	316	342	316
7	353	318	14,500	5,660	1,230	3,000	2,140	2,109	650	307	314	561
8	258	316	6,060	4,190	1,500	2,960	2,080	2,150	800	295	297	545
9	363	303	4,520	2,710	6,690	2,690	3,150	1,990	800	285	315	335
10	375	290	3,550	2,310	14,400	2,300	3,530	1,900	750	274	622	305
11	439	288	2,840	2,130	14,900	2,880	2,140	1,750	680	265	430	283
12	439	290	2,280	2,020	10,200	2,900	2,080	1,700	680	270	481	283
13	286	296	2,500	1,980	6,800	1,420	2,170	1,700	675	242	520	273
14	483	296	2,500	1,670	4,580	831	2,070	1,640	675	225	526	278
15	383	296	1,930	1,310	3,690	1,870	2,130	1,530	670	316	444	250
16	383	296	1,680	1,930	3,060	2,160	1,760	1,400	670	358	442	245
17	384	294	1,590	1,600	2,550	2,210	2,110	1,310	640	382	867	255
18	383	292	1,330	2,140	2,460	2,140	2,420	1,260	585	400	717	255
19	353	278	1,400	2,180	2,260	2,070	2,510	1,180	560	400	546	355
20	353	306	1,260	2,540	1,680	1,890	2,110	1,280	690	370	990	280
21	308	368	1,370	2,300	25,900	1,940	2,140	1,450	672	300	872	255
22	313	473	1,150	2,940	56,000	1,890	1,380	1,200	434	202	555	265
23	312	398	1,099	2,870	42,700	2,050	1,400	1,669	415	215	509	260
24	307	434	1,040	2,260	17,100	2,900	935	1,560	405	282	470	264
25	319	1,880	1,100	2,670	11,500	3,510	1,520	1,640	405	281	456	259
26	936	1,390	903	2,170	8,940	3,700	1,720	1,380	387	202	477	264
27	1,060	2,310	836	1,630	6,210	4,309	1,840	1,140	428	208	485	262
28	773	36,500	872	1,500	4,460	6,550	1,750	1,140	500	228	427	246
29	688	10,200	783	1,460	4,110	5,360	1,610	1,080	575	315	307	246
30	546	4,560	781	1,450	-------	4,790	1,580	1,040	539	428	290	239
31	456	-------	701	1,350	-------	3,900	-------	1,040	-------	308	283	-------

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Monthly discharge of Salt River near Roosevelt, Ariz., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	244	154	183	11,300
November	360	203	244	14,500
December	429	184	297	18,300
January	307	199	254	15,600
February	2,540	352	986	54,800
March	5,080	517	1,630	100,000
April	4,810	2,260	3,660	218,000
May	1,990	792	1,250	76,900
June	676	220	378	22,500
July	12,000	216	3,280	202,000
August	11,100	323	1,610	99,000
September	4,560	261	803	47,800
The year	12,000	154	1,220	881,000
1919–20				
October	1,060	258	469	28,800
November	36,500	278	2,150	128,000
December	50,600	701	4,600	283,000
January	12,300	710	2,610	160,000
February	56,000	1,230	9,010	518,000
March	6,550	831	2,810	173,000
April	3,740	935	2,120	126,000
May	2,600	1,040	1,630	100,000
June	1,040	387	642	38,200
July	442	202	305	18,800
August	990	283	480	29,500
September	561	239	299	17,800
The year	56,000	202	2,230	1,620,000

NORTH FORK OF WHITE RIVER AT WHITERIVER, ARIZ.

LOCATION.—At power plant half a mile from Fort Apache Indian School at Whiteriver, Navajo County, three-quarters of a mile above highway bridge, and 4 miles northeast of Fort Apache.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1920 (incomplete).

GAGE.—Vertical staff on right bank just below tailrace of power plant; read by Chester Gatewood during 1919 and by C. Botticher during 1920.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel; shifts during high water. Control is gravel and boulders.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 4.2 feet at 4 p. m. July 17 (discharge, 2,400 second-feet); minimum discharge, 31 second-feet on November 30.

Maximum stage recorded during the period March 1 to September 30, 1920, 1.65 feet at 7.25 a. m. May 1 (discharge, 788 second-feet); minimum discharge, 40 second-feet July 13, 14, September 11–14, 18, 19, 21–29. A high-water stage of 7 feet is believed to have occurred sometime either in November or during February (discharge, not determined).

1916–1920: Maximum stage recorded, 7 feet during February, 1920 (discharge, not determined); minimum discharge, 23 second-feet December 9 to 12, 1916.

ICE.—Stage-discharge relation probably not seriously affected by ice.

DIVERSIONS.—Water diverted for power development and returned to river above gage.

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REGULATION.—Slight fluctuation may occasionally be caused by operation of power plant just above gage.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curves applicable as follows: October 1, 1918, to April 19, 1919, poorly defined; April 20 to July 17, 1919, fairly well defined; July 18 to September 28, 1919, poorly defined; March 6, 1920, to September 30, 1920, well defined below 700 second-feet. Gage read twice daily to hundredths. Daily discharge ascertained by applying mean daily gage height to rating table except as indicated in footnote to daily-discharge table. Records for 1919 poor; for 1920 good.

COOPERATION.—Gage-height record and assistance in obtaining discharge measurements furnished by Office of Indian affairs.

Discharge measurements of North Fork of White River at Whiteriver, Ariz., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft.*	1919		*Feet*	*Sec.-ft.*
Apr. 25	J. F. Kunesh	2.64	896	Dec. 30	Beardsley and Savage	0.53	75
26	do	2.59	883	1920			
June 25	Beardsley and Gatewood	.80	78	Mar. 6	J. F. Kunesh	1.20	432
25	do	.78	72	7	do	1.18	418
Aug. 22	J. F. Kunesh	1.43	122	5	Botticher and Brady	1.54	686
23	do	1.40	111	June 5	do	.95	295
23	do	1.40	113	Sept. 21	C. W. Sopp	.08	46

Daily discharge, in second-feet, of North Fork of White River at Whiteriver, Ariz., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918-19												
1	35	38	41	41	53	53	900	480	204	110	335	85
2	34	39	38	39	46	56	900	510	186	128	620	74
3	35	40	40	44	48	59	1,020	510	169	204	690	73
4	34	39	37	41	41	57	1,100	540	164	153	585	68
5	34	40	48	41	45	58	1,140	540	156	153	430	73
6	34	43	47	39	46	59	1,140	540	137	142	370	90
7	34	45	49	40	46	65	980	510	126	217	315	119
8	35	37	131	37	49	62	715	480	128	267	261	122
9	38	38	87	40	49	62	680	455	126	330	230	110
10	45	42	75	43	51	67	615	430	122	355	212	102
11	41	45	68	46	60	63	648	405	120	430	194	95
12	37	44	67	48	67	82	750	380	112	430	400	290
13	38	45	50	46	69	100	825	355	105	430	270	280
14	37	54	45	37	58	141	1,330	330	101	430	252	189
15	37	58	48	35	54	128	1,330	380	101	1,150	230	146
16	34	50	56	38	54	107	1,140	308	95	950	256	132
17	37	44	51	41	56	114	1,230	308	96	1,360	202	113
18	37	42	49	43	59	144	1,320	287	99	1,180	172	100
19	37	48	49	47	57	213	1,400	287	89	1,090	146	107
20	42	48	48	47	56	276	1,360	267	86	1,010	132	110
21	53	44	48	45	52	462	1,190	308	78	1,010	126	97
22	48	41	51	41	51	405	1,190	287	65	810	126	88
23	44	41	48	45	53	330	1,110	308	70	620	107	82
24	43	54	33	45	58	300	990	380	72	490	100	81
25	42	42	33	46	48	189	990	267	70	430	95	78
26	44	38	33	47	48	258	870	247	65	370	159	78
27	46	36	36	46	57	304	835	247	70	656	107	129
28	41	39	40	39	48	350	695	207	65	690	93	110
29	41	41	42	44	.....	385	900	247	73	460	106	100
30	40	31	42	47	.....	520	540	236	69	355	95	100
31	41	.....	43	51	.....	788	.....	207	.....	325	95	.....

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Daily discharge, in second-feet, of North Fork of White River at Whiteriver, Ariz., for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1920												
1	------	------	------	------	------		400	745	370	102	80	50
2	------	------	------	------	------		345	745	345	90	80	50
3	------	------	------	------	------	400	345	702	320	88	90	50
4	------	------	------	------	------		370	702	320	85	70	50
5	------	------	------	------	------		370	702	298	82	50	70
6	------	------	------	------	------	430	465	660	298	80	50	90
7	------	------	------	------	------	430	575	660	275	80	80	50
8	------	------	------	------	------	370	618	660	275	70	90	50
9	------	------	------	------	------	370	702	660	275	60	115	50
10	------	------	------	------	------	370	745	660	255	60	90	50
11	------	------	------	------	------	298	575	618	235	50	80	40
12	------	------	------	------	------	245	660	575	235	50	102	40
13	------	------	------	------	------	298	660	500	218	40	90	40
14	------	------	------	------	------	370	618	465	218	40	90	40
15	------	------	------	------	------	345	639	465	200	152	90	50
16	------	------	------	------	------	320	660	400	182	70	102	50
17	------	------	------	------	------	320	618	400	182	70	90	50
18	------	------	------	------	------	320	500	370	165	70	140	40
19	------	------	------	------	------	298	500	370	152	70	128	40
20	------	------	------	------	------	345	430	430	152	60	102	50
21	------	------	------	------	------	370	430	538	128	70	102	40
22	------	------	------	------	------	400	400	745	140	60	90	40
23	------	------	------	------	------	370	465	660	128	50	90	40
24	------	------	------	------	------	370	575	538	128	50	90	40
25	------	------	------	------	------	370	618	500	128	102	90	40
26	------	------	------	------	------	400	500	500	165	90	90	40
27	------	------	------	------	------	370	500	500	165	80	80	40
28	------	------	------	------	------	370	538	430	165	80	80	40
29	------	------	------	------	------	235	618	400	115	90	70	40
30	------	------	------	------	------	320	702	370	102	80	60	50
31	------	------	------	------	------	370	------	370	------	90	50	------

NOTE.—No gage record Sept. 29, 30, 1919, and Mar. 1–5, 1920, discharge estimated from other records in basin. No gage record Mar. 11, Apr. 15, and July 2–5, 1920; discharge interpolated. Power plant not in commission and no gage observer available during period Oct. 1, 1919, to Mar. 5, 1920. Braced figure shows mean daily discharge for period indicated.

Monthly discharge of North Fork of White River at Whiteriver, Ariz., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	53	34	39.3	2,420
November	58	31	42.9	2,550
December	131	33	50.7	3,120
January	51	35	43.9	2,640
February	67	41	52.5	2,920
March	788	53	199	12,200
April	1,400	540	984	58,600
May	540	207	361	22,200
June	204	65	107	6,370
July	1,360	110	540	33,200
August	600	93	242	14,900
September	200	68	114	6,780
The year	1,400	31	232	168,000
1920				
March	430	235	298	18,000
April	745	345	538	32,000
May	745	370	550	33,800
June	370	102	211	12,600
July	152	40	74.5	4,580
August	140	50	87.1	5,360
September	90	40	47.0	2,800
The period	----------	----------	----------	169,000

NOTE.—See footnote to table of daily discharge.

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WHITE RIVER AT FORT APACHE, ARIZ.

LOCATION.—At highway bridge on Fort Apache Military Reservation, just below junction of North and East forks, at Fort Apache, Navajo County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 23, 1912, to September 30, 1920 (incomplete).

GAGE.—Vertical staff fastened to downstream end of left abutment of bridge; read by United States Army. Datum of gage raised 4.40 feet on January 20, 1915, and lowered 0.64 foot on December 5, 1916.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel with gravel riffle; shifts during floods. Left bank subject to overflow during extreme high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 2.7 feet at 8.35 a. m. July 15 (discharge, 1,830 second-feet); minimum discharge, 39 second-feet, October 8.

Maximum stage recorded during year ending September 30, 1920, record incomplete. A high-water stage of about 8 feet is believed to have occurred either about November 30 or during February, discharge not determined; minimum stage, record incomplete.

1912–1920: Records incomplete. A minimum discharge of 25 second-feet occurred on November 3 and 4, 1915.

DIVERSIONS.—Small quantity of water diverted for irrigation by the Indians several miles above station; amount not known.

ACCURACY.—Stage-discharge relation not permanent. Rating curves used applicable as follows: October 1, 1918, to July 15, 1919, well defined below 2,000 second-feet; July 16 to November 29, 1919, poorly defined; March 6 to April 3, 1920, poorly defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, except as indicated in footnote to daily-discharge table. Records for 1919 good; for 1920 poor.

COOPERATION.—Gage-height record furnished by United States Army.

Discharge measurements of White River at Fort Apache, Ariz., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft.*	1920		*Feet*	*Sec.-ft.*
Apr. 25	J. F. Kunesh	2.29	1,200	Mar. 6	J. F. Kunesh	1.51	459
25	do	2.22	1,170	7	do	1.50	436
26	do	2.15	1,110	Sept. 21	C. W. Sopp	.38	55
Aug. 22	do	1.15	155				
23	do	1.13	147				

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Daily discharge, in second-feet, of White River at Fort Apache, Ariz., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	40	55	62			90		690	425	260	378	152
2	40	52	63			94		690	410	295	650	123
3	40	52	62		70	98		730	360	360	1,080	78
4	40	52	63			97		775	338	315	710	78
5	40	52	62			97		775	315	315	540	78
6	40	58	65		86	96		775	295	315	460	105
7	43	62	67		78	101		775	275	490	418	180
8	39	52	65		74	106		730	275	490	366	180
9	41	52	55		83	111		690	267	520	319	225
10	69	58	58	60	92	116		650	243	520	366	189
11	56	65	62		98	130		615	228	690	265	172
12	55	62	67		128	133	1,200	615	228	730	460	275
13	50	62	56		116	156		580	228	775	330	319
14	46	72	63		96	243		580	209	690	330	319
15	46	76			92	255		550	194	1,830	236	308
16	46	80			102	224		550	194	960	354	140
17	44	70			111	194		520	182	840	342	140
18	43	65			128	243		520	170	1,860	236	156
19	46	70		74	133	338		520	170	1,220	245	164
20	49	70		74	130	410		490	159	1,020	225	172
21	60	65		76		490		490	154	1,360	180	136
22	72	72		69		460		520	148	1,080	172	149
23	72	55	55	65		410		520	143	785	148	136
24	58	55		67	70	338		520	138	710	140	105
25	72	55		67		315	1,270	490	153	508	109	105
26	62	55		69		315	1,150	460	126	476	126	112
27	60	46		71		385	1,090	460	126	508	172	189
28	58	54		71		460	920	530	126	508	140	189
29	56	62		70	-------	520	870	460	123	508	148	140
30	55	62		70	-------	670	820	460	138	418	140	112
31	55	-------		70	-------	820	-------	435	-------	378	140	-------

Day	Oct.	Nov.	Mar.	Apr.	Day	Oct.	Nov.	Mar.	Apr.
1919–20					1919–20				
1	112	83	-------	1,790	16	74	54	2,290	-------
2	105	83	-------	1,630	17	70	54	2,290	-------
3	100	78	-------	1,630	18	70	54	2,290	-------
4	94	78	-------	-------	19	65	78	1,950	-------
5	89	74	-------	-------	20	61	78	1,870	-------
6	83	74	450	-------	21	57	74	1,870	-------
7	78	70	450	-------	22	57	70	1,950	-------
8	78	70	450	-------	23	54	70	1,950	-------
9	78	65	485	-------	24	54	70	2,290	-------
10	83	65	485	-------	25	225	70	2,290	-------
11	89	61	1,560	-------	26	164	78	2,470	-------
12	89	61	2,290	-------	27	126	83	2,470	-------
13	83	57	2,650	-------	28	112	83	2,290	-------
14	78	57	2,470	-------	29	100	78	2,290	-------
15	74	57	2,470	-------	30	94	-------	2,290	-------
					31	89	-------	1,950	-------

NOTE.—No gage heights and discharge interpolated Oct. 5, 6, 13, 21, 27, 29, 31, Nov. 3, 10, 15, 17–20, 24, 25, 28, 1918; Feb. 9, 16, Mar. 2, 4, 5, 7–9, 16, 30, 1919. No gage heights Jan. 20–31, discharge estimated. No gage-height record furnished for period Nov. 30, 1919, to Mar. 5, 1920, Apr. 4 to Sept. 30, 1920. Braced figures show mean daily discharge for periods indicated for which no records were furnished.

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Monthly discharge of White River at Fort Apache, Ariz., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	72	39	51.4	3,160
November	80	52	60.6	3,610
December	----------	----------	58.2	3,580
January	----------	----------	64.3	3,950
February	----------	----------	87.8	4,880
March	820	90	275	16,900
April	----------	----------	1,160	69,000
May	775	435	586	36,000
June	435	123	218	13,000
July	1,830	200	683	42,000
August	1,080	100	321	19,700
September	319	78	164	9,760
The year	----------	39	312	226,000
1919–20				
October	225	54	89.8	5,520
November 1–29	83	54	69.9	4,020
March 6–31	2,650	450	1,570	96,400

NOTE.—See footnote to table of daily discharge.

EAST FORK OF WHITE RIVER AT FORT APACHE, ARIZ.

LOCATION.—On Fort Apache Military Reservation at Fort Apache, Navajo County, half a mile above junction with North Fork of White River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 8, 1912, to September 30, 1920 (incomplete), when station was discontinued.

GAGE.—Vertical staff fastened to ash tree on left bank opposite officers' quarters; read by United States Army. Datum raised 5.00 feet June 27, 1915; lowered 0.40 foot, August 5, 1917.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Bed composed of boulders and gravel; slightly shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 2.5 feet July 21 (discharge, 399 second-feet); minimum discharge, 2 second-feet, October 1–9.

Maximum stage recorded during year ending September 30, 1920, record incomplete. A stage of about 8 feet is believed to have occurred either about November 29 or during February, discharge not determined; minimum stage, record incomplete.

1919–1920: Records incomplete. A minimum discharge of 2 second-feet occurred September 23–25, 27–30, 1918, and October 1–9, 1918.

ACCURACY.—Stage-discharge relation not permanent. Rating curves used applicable as follows: October 1, 1918, to July 21, 1919, and July 22, 1919, to April 3, 1920, both fairly well defined below 300 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, except as indicated in footnote to daily discharge table. Records fair.

COOPERATION.—Gage-height record furnished by United States Army.

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Discharge measurements of East Fork of White River at Fort Apache, Ariz., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft.*	1920		*Feet*	*Sec.-ft.*
Apr. 25	J. F. Kunesh	1.98	267	Mar. 6	J. F. Kunesh	1.29	181
26	do	1.85	234	7	do	1.28	102
Aug. 22	do	.70	33	Sept. 21	C. W. Sopp	.56	12
23	do	.72	33				

Daily discharge, in second-feet, of East Fork of White River at Fort Apache, Ariz., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918-19												
1	2	6			10	17		137	117	19	72	32
2	2	6			10	16		148	102	41	140	32
3	2	6			10	16		148	91	43	180	25
4	2	5			12	16		169	83	62	140	25
5	2	5			12	17		179	77	86	106	25
6	2	6			12	17		190	67	77	91	23
7	2	6			12	20		190	62	120	72	42
8	2	6			10	22		179	59	169	69	52
9	2	6			12	25		151	59	123	64	77
10	8	6		10	15	28		148	52	140	59	64
11	6	7			18	42		149	47	159	52	52
12	4	7			27	39		148	47	159	64	48
13	4	7			26	53	250	140	47	223	62	64
14	4	9			17	76		137	43	179	62	74
15	4	9			14	75		133	35	390	52	72
16	4	9	9		16	64		133	39	274	52	64
17	4	9			18	54		133	31	236	46	64
18	4	9			26	75		123	26	274	48	44
19	5	10		11	27	101		133	24	330	42	46
20	6	10		10	28	123		130	24	301	42	46
21	7	10		10		142		120	21	399	38	44
22	7	9		10		137		144	21	352	36	40
23	6	8		10		108		140	18	238	32	32
24	6	8		8		94		140	16	180	32	30
25	13	8		9	15	80	261	120	15	140	32	30
26	9	8		8		80	248	114	14	126	32	36
27	5	6		9		100	212	117	14	103	38	43
28	4	7		8		117	179	130	14	106	38	42
29	4	8		8	-------	140	156	126	15	106	36	36
30	5	7		8	-------	176	140	123	18	91	32	32
31	6	-------		8	-------	212	-------	117	-------	83	32	-------

Day	Oct.	Nov.	Mar.	Apr.	Day	Oct.	Nov.	Mar.	Apr.
1919-20					1919-20				
1	30	25	-------	191	16			140	-------
2	27	25	-------	180	17			140	-------
3		23	-------	180	18			140	-------
4		23	-------	-------	19			140	-------
5		23	-------	-------	20	20		140	-------
6		23	108	-------	21			140	-------
7		23	106	-------	22		15	150	-------
8		23	106	-------	23			160	-------
9	20		109	-------	24			180	-------
10			112	-------	25	40		202	-------
11		15	170	-------	26	38		202	-------
12			180	-------	27	36		202	-------
13			180	-------	28	34		191	-------
14			180	-------	29	32	-------	191	-------
15			170	-------	30	30	-------	180	-------
					31	27	-------	180	-------

NOTE.—No gage heights and discharge interpolated Oct. 5, 6, 13, 19-21, 26, 28, 31, Nov. 3, 10, 17-20, 24, 25, 28, 1918; Jan. 29 to Feb. 5, 9, 16, Mar. 2, 4, 5, 7-9, 16, 30, 1919. No gage heights furnished for periods Oct. 3-24, Nov. 9, 1919, to Mar. 5, 1920, Apr. 4 to Sept. 30, 1920. Braced figures show mean daily discharge for periods indicated for which no records were furnished.

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Monthly discharge of East Fork of White River at Fort Apache, Ariz., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	13	2	4.6	283
November	10	5	7.4	440
December			9.0	553
January			9.6	590
February			16.1	894
March	212	16	78.6	4,830
April			240	14,300
May	190	114	142	8,730
June	117	14	43.3	2,580
July	399	19	172	10,600
August	180	32	61.1	3,760
September	77	23	44.5	2,650
The year			68.2	49,900
1919–20				
October	40		23.7	1,460
November 1–28	25		17.4	966
March 6–31	202	106	158	8,150

NOTE.—See footnote to table of daily discharge.

TONTO CREEK NEAR ROOSEVELT, ARIZ.

LOCATION.—In sec. 14, T. 6 N., R. 10 E., 6 miles above upper end of Roosevelt reservoir and 15 miles northwest of Roosevelt, Gila County.

DRAINAGE AREA.—1,004 square miles (measured by United States Bureau of Reclamation).

RECORDS AVAILABLE.—October 1, 1913, to September 30, 1920.

GAGE.—Vertical staff on right bank. Site of gage is changed from time to time owing to shifting control.

DISCHARGE MEASUREMENTS.—Made by wading at low stages and by slope method at high stages.

CHANNEL AND CONTROL.—Bed composed of boulders and gravel; shifts at high stages. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge during year ending September 30, 1919, 2,400 second-feet, February 2; minimum mean daily discharge, 1 second-foot, October 2–21.

Maximum mean daily discharge during year ending September 30, 1920, 9,880 second-feet, February 22; minimum mean daily discharge, 5 second-feet, July 20.

1913–1920: Maximum mean daily discharge, 15,800 second-feet, January 19, 1916; minimum discharge, 1 second-foot, September 1–3, and October 2–21, 1918.

DIVERSIONS.—There are no diversions near this station. The entire flow is discharged into Roosevelt reservoir.

ACCURACY.—Discharge measurements made as often as appears necessary to determine changes in stage-discharge relation. During part of 1919 and 1920, when flood gage was washed out, the discharge was estimated from contents of Roosevelt reservoir as indicated in foot-note to daily-discharge table.

COOPERATION.—Record of daily discharge furnished by Salt River Valley Water Users' Association.

The following discharge measurement was made by J. F. Kunesh:

February 9, 1919: Gage height, 77.38 feet; discharge, 648 second-feet.

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Daily discharge, in second-feet, of Tonto Creek near Roosevelt, Ariz., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	2	2	17	58	69	365	330	55	12	4	250	46
2	1	2	11	64	2,400	250	335	61	12	4	975	62
3	1	2	10	69	1,600	240	330	59	12	75	700	46
4	1	2	6	63	900	305	295	61	10	80	700	40
5	1	2	5	70	760	318	365	61	5	65	650	40
6	1	2	5	65	680	310	365	61	10	65	600	24
7	1	2	6	88	500	305	365	59	7	65	425	26
8	1	2	850	88	490	290	303	58	5	100	400	36
9	1	2	205	76	460	290	254	58	5	50	210	75
10	1	2	185	98	508	285	230	58	5	50	200	60
11	1	2	165	92	485	280	195	55	5	100	125	30
12	1	2	133	89	490	255	175	54	5	100	100	10
13	1	2	110	90	630	250	140	24	5	100	100	10
14	1	2	89	86	570	248	68	24	5	225	95	10
15	1	360	51	86	470	410	230	55	5	400	95	10
16	1	76	45	75	410	370	200	54	5	400	95	25
17	1	39	42	49	368	360	185	54	5	400	100	25
18	1	24	42	45	430	370	170	27	5	1,100	90	25
19	1	17	42	35	510	385	157	27	5	575	175	20
20	1	10	42	29	415	400	145	27	5	550	170	25
21	1	8	42	25	430	385	150	12	4	325	160	20
22	2	7	390	22	890	400	125	12	4	325	100	20
23	2	6	370	18	790	410	77	12	4	320	95	25
24	2	6	122	15	690	340	86	12	4	200	85	25
25	2	220	89	15	610	365	70	12	5	200	70	35
26	2	130	96	35	500	392	70	12	9	170	70	35
27	2	113	66	22	415	385	69	14	8	170	60	40
28	2	47	60	22	350	385	70	14	8	190	50	50
29	2	80	42	29	-------	359	70	16	5	209	48	30
30	2	22	37	16	-------	350	64	16	4	200	50	50
31	2	-------	84	18	-------	320	-------	16	-------	180	50	-------
1919–20												
1	50	68	609	185	287	638	659	206	35	35	25	16
2	45	62	612	125	225	908	508	235	35	21	19	16
3	25	56	504	120	248	516	400	242	27	21	13	14
4	20	45	407	265	248	369	375	290	26	20	8	13
5	40	38	3,740	2,170	273	248	375	111	25	20	13	11
6	35	31	8,920	1,440	216	172	338	119	26	20	39	27
7	33	30	2,540	998	217	528	378	111	25	20	16	76
8	29	30	1,070	740	265	521	368	113	25	12	33	70
9	30	29	840	478	1,180	475	556	105	25	12	16	27
10	36	29	626	408	2,530	801	623	100	25	8	33	20
11	31	28	501	375	2,630	508	378	92	21	8	1,500	21
12	29	28	402	357	1,700	513	367	89	21	8	86	17
13	31	24	440	350	1,200	251	383	90	21	7	73	17
14	31	19	441	296	808	147	365	86	20	7	92	16
15	28	19	341	231	650	330	377	75	18	10	122	17
16	28	15	296	340	538	382	310	75	18	6	64	17
17	22	15	281	282	450	391	373	75	17	6	86	17
18	21	12	284	378	435	377	427	75	17	6	88	17
19	21	10	248	385	398	365	443	70	25	6	1,680	14
20	14	10	222	449	296	334	372	78	19	5	1,350	17
21	13	44	243	405	4,560	343	372	49	19	6	134	11
22	21	54	204	618	9,880	333	243	56	18	12	120	9
23	12	39	192	454	7,530	361	318	55	18	10	92	14
24	13	150	184	400	3,020	512	165	56	17	10	75	12
25	24	279	176	365	2,090	620	268	61	17	30	45	14
26	160	246	159	333	1,580	662	294	61	17	24	150	14
27	150	408	148	288	1,100	758	324	50	17	8	60	14
28	163	6,480	154	265	787	1,160	350	47	25	7	222	13
29	63	1,800	138	248	726	945	284	40	35	21	31	11
30	84	805	138	256	-------	845	278	35	35	21	29	11
31	44	-------	124	238	-------	688	-------	35	-------	22	27	-------

NOTE.—Flood gage washed out and daily discharge computed from reservior contents July 3–8, July 12 to Aug. 29, Sept. 9 to Oct. 7, 26, 27, Nov. 24, 1919 to May 18, 1920, Aug. 11, 19–21, 24, 25, 1920. For other short periods when gage was not read discharge was interpolated.

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Monthly discharge of Tonto Creek near Roosevelt, Ariz., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	2	1	1.4	86
November	360	2	38.1	2,270
December	850	5	112	6,890
January	98	15	53.3	3,280
February	2,400	60	634	35,200
March	410	240	334	20,500
April	365	64	189	11,200
May	61	12	36.8	2,260
June	12	4	6.3	375
July	1,100	4	225	13,800
August	975	48	229	14,100
September	75	10	33.2	1,980
The year	2,400	1	155	112,000
1919–20				
October	163	13	43.4	2,670
November	6,430	10	362	21,500
December	8,920	124	811	49,900
January	2,170	125	460	28,300
February	9,880	216	1,590	91,500
March	1,160	147	499	30,700
April	659	165	375	22,300
May	289	35	96.0	5,900
June	35	17	23.0	1,370
July	35	5	13.8	848
August	1,690	8	204	12,500
September	76	9	19.4	1,150
The year	9,880	5	370	269,000

VERDE RIVER NEAR CLARKDALE, ARIZ.

LOCATION.—In T. 17 N., R. 3 E., 4 miles below mouth of Sycamore Creek and 5 miles above Clarkdale, Yavapai County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 18, 1915, to September 30, 1920 (incomplete).

GAGE.—Stevens continuous water-stage recorder installed on left bank June 18, 1915; referred to vertical staff 30 feet upstream until October 8, 1918, when it was referred to a vertical staff fastened to gage well. Datum lowered 0.65 foot December 8, 1917. Inspected by engineers of United Verde Copper Co.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Bed composed of sand, gravel, and boulders; shifting during high water. No well-defined control. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during the year ending September 30, 1919, not known as recorder failed to operate; minimum stage, from water-stage recorder, 1.5 feet October 8–12 (discharge, 77 second-feet).

Maximum stage during the year ending September 30, 1920, from water-stage recorder, 19.1 feet at 1.30 p. m. February 21 (discharge, 50,600 second-feet, from extension of rating curve); minimum stage, from water-stage recorder, 1.75 feet August 31 to September 1 (discharge, 55 second-feet).

1915–1920: Maximum stage recorded, that of February 21, 1920; minimum discharge recorded, that of August 31 to September 1, 1920.

DIVERSIONS.—Water is diverted above and below station for irrigating a few small ranches; amount not known.

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ACCURACY.—Stage-discharge relation changed during high water of January; 1920. Rating curves, referred to staff gage on well, used as follows: October 1, 1918 to January 5, 1920, fairly well defined below 400 second-feet, but poorly defined above; January 6 to February 20, 1920, 0.3 foot added to gage readings before applying to previous rating, poorly defined; March 5 to September 30, 1920, fairly well defined below 400 second-feet. Operation of water-stage recorder unsatisfactory, largely on account of silt in well (see footnote to daily-discharge table). Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting gage-height graph except for days when stage fluctuated rapidly, when daily discharge was determined from hourly discharge. Records fair for the year ending September 30, 1919; poor, October, 1919, to February, 1920; fair, March to May, 1920; good, June to September, 1920.

COOPERATION.—Station established and maintained in cooperation with United Verde Copper Co.

Discharge measurements of Verde River near Clarkdale, Ariz., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
1918				1920			
Dec. 9	J. F. Kunesh	1.57	85	Jan. 30	Kunesh and Gerrish	1.84	186
1919				Mar. 25	Gerrish and Bundy	1.90	76
Feb. 20	do	1.57	94	June 18	do	1.88	64
May 5	do	1.51	78	Aug. 2	Terry and Gerrish	1.95	78
5	do	1.51	76				
Aug. 30	do	1.57	80				
Dec. 23	Gerrish and Terry	1.78	122				

Daily discharge, in second-feet, of Verde River near Clarkdale, Ariz., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19												
1	80	82	87	82	87	82	1,460		85	86	265	112
2	80	84	87	82	87	82	980	80	84	232		370
3	80	84	87	82	87	82	630		84	332		312
4	80	84	87	82	87	82	465		84	275		252
5	80	84	87	82	87	84	375	78	84	243		209
6	80	84	87	82	87	84	288	80	82	241		186
7	80	84	87	82	87	84	198	80	82	237		167
8	77	85	87	82	87	84		80	82	234		264
9	77	85	87	82	87	84		80	82	234		275
10	77	85	87	82	87	84		81	81	234	275	220
11	77	85	87	83	87	84		81	81	275		178
12	77	85	86	83	86	84		82	81	465		146
13	77	85	85	83	86	117		82	81	510		125
14	77	85	84	83	86	167		84	80			106
15	78	85	84	83	86	131		84	80			85
16	78	85	84	84	86	110		84	80			85
17	79	85	84	84	86	198		84	80			85
18	79	85	82	84	86	450		85	80		142	86
19	80	85	82	84	86	480	90	85	80		188	87
20	80	85	82	84	86	510		86	80		133	154
21	81	85	82	85	86	510		86	80	1,000	131	125
22	81	86	81	85	85	425		87	80		127	96
23	82	86	81	85	84	392		87	80		142	93
24	82	86	81	85	84	375		87	80		127	93
25	82	86	81	85	83	530		86	80		98	92
26	82	86	81	86	82	710		86	80		89	90
27	82	87	81	86	82	835		86	80		89	119
28	82	87	82	86	82	1,100		86	80		87	167
29	82	87	82	86	.....	1,220		85	80		87	108
30	82	87	82	86	.....	1,540		85	80		87	92
31	82	.....	82	87	.....	1,660	.....	85	.....	161	87	.....

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Daily discharge, in second-feet, of Verde River near Clarkdale, Ariz., for the years ending Sept. 30, 1919 and 1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919-20												
1	90			116	188		735	66	66	73	88	55
2	90		1,000	108	350	300	430	66	66	73	80	66
3	90			106	275		354	73	73	73	88	73
4	84			2,050	209		288	73	73	66	217	66
5	84	80	1,320	4,660	167	288	230	66	73	66	115	66
6	84		2,460		146	188	167	73	73	66	88	60
7	84		980		136	115	135	73	66	66	88	60
8	84				136	96	115	73	73	66	88	60
9	84				5,220	88		73	66	73	80	60
10	84		350		4,750	88		73	66	73	80	60
11	84	77		450	4,600	88		73	66	73	80	60
12	84	77			2,200	88		73	73	73	80	60
13	84	77	116		1,000	88		73	66	73	80	66
14	84		116		590	80		73	66	73	552	66
15	84		116		440	80		73	66	73	272	73
16	84	80	116		290	73		73	66	80	115	73
17	84		116	146	198	73			66	73	96	73
18	84		116	241	198	73	82		66	73	66	73
19	84		125	312	198	73			66	73	430	73
20	84		125	350	2,370	73			66	66	145	73
21	84	84	125	570	15,000	73			66	66	115	73
22	84	84	125	465		73			66	73	96	73
23	84	84	125	610		80			66	73	80	66
24		84	125	510		80		86	66	73	73	66
25		84	125	264	5,000	73			66	66	66	66
26		84	125	198		80			66	80	66	66
27	800	13,300	125	198		135			73	80	73	66
28		4,460	125	198		167	73		88	73	80	66
29		1,320	125	198		217	73		80	73	66	66
30		1,000	116	198	-------	320	66		73	88	60	66
31		-------	116	178	-------	620	-------		-------	73	55	-------

NOTE.—Braced figures show mean discharge for periods indicated during which the recorder was not operating. No record obtained Jan. 1-4, 7, Feb. 2, 4-19, 21-26, 1919; discharge interpolated. Discharge estimated Nov. 30, 1919, Feb. 12-16, 21, 1920, by comparison with other records in Verde River Basin. Daily discharge determined from hourly discharge July 11, Aug. 1, Sept. 1, 2, Nov. 27, 28, 1919, Jan. 4, 5, and Feb. 20, 1920.

Monthly discharge of Verde River near Clarkdale, Ariz., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	82	77	79.8	4,910
November	87	82	85.1	5,060
December	87	81	84.1	5,170
January	87	82	83.8	5,150
February	87	82	85.7	4,760
March	1,660	82	402	24,700
April	1,460	-------	216	12,900
May	87	78	83.3	5,120
June	85	80	81.1	4,830
July	-------	86	670	41,200
August	-------	87	201	12,400
September	370	85	152	9,040
The year	-------	77	187	135,000
1919-20				
October	-------	84	269	16,500
November	13,300	-------	736	43,800
December	2,460	116	413	25,400
January	4,660	106	536	33,000
February	15,000	136	2,710	156,000
March	620	73	154	9,470
April	735	66	141	8,390
May	-------	66	78.6	4,830
June	88	66	69.1	4,110
July	88	66	72.4	4,450
August	532	55	121	7,440
September	73	55	66.3	3,95[illegible]
The year	15,000	55	427	317,0[illegible]

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VERDE RIVER AT CAMP VERDE, ARIZ.

LOCATION.—In sec. 30, T. 14 N., R. 5 E., at steel highway bridge just above town of Camp Verde, Yavapai County, and above mouth of Beaver Creek.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 5, 1912, to March 31, 1920, at which time station was discontinued.

GAGE.—Chain gage on downstream side of bridge, installed November 12, 1915, at datum 1.8 feet above original gage; read by Mrs. A. L. Vyne. Original gage was a vertical staff painted on east bridge pier.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of clay and sand; shifting during high water. No well-defined control. Banks not subject to overflow except at extremely high water. Gage record affected by backwater when Beaver Creek is at high stage.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, 5.4 feet at 8 p. m. July 18 (discharge, 4,750 second-feet); minimum discharge, 42 second-feet, various days in May.

Maximum stage during period October 1, 1919, to March 31, 1920, 17.5 feet at 8 a. m. February 22 (discharge, 32,000 second-feet); minimum stage, −0.20 foot December 22 to January 2 (discharge, 115 second-feet).

1912–1920 (March 31): Maximum stage recorded, that of February 22, 1920; minimum discharge, 31 second-feet, June 28 and 29, 1914.

ACCURACY.—Stage-discharge relation not permanent. Rating curves used applicable as follows: October 1, 1918, to March 31, 1919, well defined; April 1 to November 27, 1919, fairly well defined below 500 second-feet, poorly defined above; November 28, 1919, to February 22, 1920, poorly defined; and February 23 to March 31, 1920, poorly defined. Gage read to half-tenths daily; oftener during high water. Daily discharge ascertained by applying mean daily gage height to rating table, or by averaging hourly discharge for days when stage fluctuated rapidly. Records fair for low stages and poor for high stages.

Discharge measurements of Verde River at Camp Verde, Ariz., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1918		*Feet*	*Sec.-ft.*	1919		*Feet*	*Sec.-ft.*
Dec. 9	J. F. Kunesh	1.13	184	Aug. 29	J. F. Kunesh	0.15	74
31	N. A. Vyne	1.02	149	29	do	.13	70
1919				Oct. 17	N. A. Vyne	.25	134
Feb. 19	J. F. Kunesh	1.18	215	1920			
20	do	1.18	186	Jan. 28	J. F. Kunesh	.37	387
May 6	do	−.10	50	29	do	.36	397
June 16	N. A. Vyne	−.02	41	Mar. 12	do	1.00	491
July 31	do	1.00	308				

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Daily discharge, in second-feet, of Verde River at Camp Verde, Ariz., for the period Oct. 1, 1918, to Mar. 31, 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept
1918-19												
1	70	125	112	150	220	180	2,750	58	44	43	400	138
2	80	125	112	150	220	150	2,530	54	44	43	1,460	138
3	80	125	112	150	180	150	1,870	50	44	45	920	138
4	80	125	112	150	180	150	1,760	54	44	328	450	138
5	90	138	112	150	180	150	920	46	44	138	305	138
6	90	150	138	150	165		840	46	44	138	248	138
7	90	138	150	150	150		662	50	44	150	248	175
8	90	138	180	150	150		400	46	44	265	248	328
9	90	125	192	150	150		265	46	44	150	248	285
10	100	125	200	150	150		230	50	44	150	240	265
11	100	138	200	150	150	200	215	50	44	162	233	248
12	100	150	200	138	165		215	46	44	425	225	200
13	90	150	200	138	180		188	42	44	1,360	216	150
14	100	150	180	138	180		175	46	44	1,760	207	125
15	100	150	180	138	165		175	42	44	2,530	198	125
16	100	150	180	138	165		150	42	43	1,460	189	112
17	100	150	180	138	165	260	138	42	43	1,870	180	112
18	112	150	180	138	174	350	125	46	43	3,410	171	112
19	112	150	165	125	171	1,050	100	42	43	1,870	162	112
20	150	150	165	125	165	1,140	90	42	43	1,560	153	112
21	138	150	165	125	165	1,430	73	42	43	1,610	144	112
22	125	125	180	125	159	1,430	73	42	43	1,270	135	112
23	112	138	165	125	156	1,230	73	46	43	960	126	125
24	112	138	168	125	153	720	73	46	43	598	117	112
25	112	138	165	125	153	580	67	42	43	350	108	112
26	112	138	150	138	150	880	67	42	43	230	99	100
27	112	125	150	150	150	1,530	58	42	43	215	90	100
28	112	125	150	150	150	1,530	58	42	43	1,540	81	285
29	112	125	150	150	-------	2,080	58	42	43	1,360	72	175
30	112	125	150	150	-------	2,630	62	42	43	880	111	150
31	125	-------	156	180	-------	2,630	-------	42	-------	305	150	-------

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1919-20							1919-20						
1	138	162	1,610	115	442	500	16	132	138	155	200	760	330
2	138	138	1,300	115	498	430	17	132	138	135	250	498	330
3	138	138	925	200	700	1,620	18	132	138	135	586	498	330
4	125	150	925	470	525	1,210	19	132	138	135	498	890	310
5	125	150	1,700	3,820	415	1,080	20	132	162	135	481	2,330	310
6	125	150	1,520	3,220	332	730	21	132	188	135	825	16,500	310
7	125	150	1,340	1,080	332	600	22	132	175	115	760	21,000	310
8	125	150	1,100	525	2,800	500	23	132	188	115	792	9,500	390
9	125	150	760	442	6,720	430	24	145	155	115	1,180	6,200	360
10	125	150	415	332	6,000	430	25	2,750	175	115	858	1,570	360
11	132	138	305	278	3,700	470	26	1,450	565	115	640	600	380
12	132	138	250	225	2,770	430	27	1,870	15,200	115	442	500	410
13	132	138	155	200	2,580	430	28	1,140	5,000	115	415	500	430
14	132	138	155	200	2,380	410	29	400	2,110	115	415	590	470
15	132	138	155	200	1,340	360	30	215	1,750	115	442	-------	660
							31	175	-------	115	442	-------	840

NOTE.—No gage-height record Aug. 19-28 and 30, 1919; discharge interpolated. Braced figure shows mean discharge for period indicated, as no record was obtained; estimated from comparison with flow near Clarkdale, Ariz.

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Monthly discharge of Verde River at Camp Verde, Ariz., during the period Oct. 1, 1918, to Mar. 31, 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918–19				
October	150	70	103	6,330
November	150	125	138	8,210
December	200	112	161	9,900
January	180	125	142	8,730
February	220	150	166	9,220
March	2,680	150	725	44,600
April	2,750	58	482	28,700
May	58	42	45.5	2,800
June	44	43	43.5	2,590
July	3,410	43	877	53,900
August	1,460	72	256	15,700
September	328	100	156	9,280
The year	3,410	42	276	200,000
1919–20				
October	2,750	125	360	22,100
November	15,200	138	947	56,400
December	1,700	115	471	29,000
January	3,820	115	663	40,800
February	21,000	332	3,220	185,080
March	1,620	310	519	31,900
The period				365,000

VERDE RIVER NEAR McDOWELL, ARIZ.

LOCATION.—At dam site on Salt River Indian Reservation, three-fourths mile above junction with Salt River and 5½ miles below McDowell, Maricopa County.

DRAINAGE AREA.—6,000 square miles (furnished by United States Bureau of Reclamation).

RECORDS AVAILABLE.—August 14 to September 30, 1889; April 20, 1897, to November 11, 1899; January 1, 1901, to April 19, 1902; July 23–26, 1902; January 1, 1903, to September 30, 1920.

GAGE.—Painted on granite rocks on right bank.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading. Since November, 1913, measurements have been made regularly, three or four times a week, by a resident hydrographer.

CHANNEL AND CONTROL.—Sand; shifts.

EXTREME OF DISCHARGE.—Maximum mean daily discharge during year ending September 30, 1919, 7,440 second-feet, July 20; minimum discharge, 80 second-feet, June 28.

Maximum mean daily discharge during year ending September 30, 1920, 48,200 second-feet on February 23; minimum discharge, 117 second-feet, July 14.

1897–1920: Maximum mean daily discharge, 61,500 second-feet, November 27, 1905; minimum mean daily discharge, 32 second-feet, July 19 and 20, 1904.

DIVERSIONS.—See Verde River at Camp Verde. Water is diverted 5 miles above station for use on Indian Reservation.

COOPERATION.—Daily-discharge record furnished by Salt River Valley Waterers' Association.

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Daily discharge, in second-feet, of Verde River near McDowell, Ariz., for the years ending Sept. 30, 1919 and 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918-19												
1	142	240	361	420	340	535	4,850	210	218	102	1,400	273
2	142	240	340	405	2,700	510	5,400	218	181	94	4,820	260
3	142	240	340	385	2,700	470	4,400	210	181	141	5,020	245
4	140	240	340	393	1,250	475	3,980	205	181	346	2,380	294
5	143	243	386	385	905	450	2,850	200	170	382	1,440	376
6	143	236	336	380	805	500	2,890	185	154	382	1,020	456
7	153	236	361	326	700	530	2,020	185	135	355	770	315
8	162	270	413	350	636	560	1,980	185	135	450	595	270
9	160	300	1,300	322	636	545	1,430	188	135	498	563	815
10	165	305	745	315	708	540	1,180	173	143	1,500	545	1,550
11	165	289	585	325	780	760	985	162	127	615	545	877
12	191	258	530	330	875	660	845	158	118	550	600	695
13	193	278	525	330	1,280	640	745	154	110	2,020	510	500
14	195	292	435	322	1,120	950	700	152	108	4,860	433	475
15	201	1,100	420	298	980	1,330	582	150	99	2,720	394	460
16	201	470	410	326	900	1,320	560	160	99	7,350	355	460
17	208	340	435	348	785	1,100	580	160	99	5,800	350	410
18	201	320	435	348	630	970	525	160	99	5,330	660	360
19	190	325	342	371	660	935	472	154	99	5,000	682	333
20	190	340	325	371	770	1,870	380	132	99	7,440	655	285
21	215	342	341	358	920	2,870	320	130	92	3,080	555	285
22	203	342	470	340	1,030	3,240	288	132	98	2,730	420	280
23	247	342	515	325	1,010	3,100	288	160	98	2,560	395	280
24	260	342	470	325	930	2,490	275	151	84	1,840	500	270
25	280	425	470	324	770	2,020	250	140	83	1,670	372	264
26	234	400	420	324	670	1,970	250	140	83	1,080	362	264
27	232	420	411	324	630	1,820	250	151	85	810	358	520
28	237	425	450	324	565	3,260	246	185	80	815	358	1,330
29	238	396	498	339	------	3,640	243	200	83	1,060	330	480
30	236	378	412	335	------	4,070	225	230	85	2,320	351	465
31	236	------	420	340	------	4,230	------	245	------	2,000	828	------
1919-20												
1	515	685	4,600	485	910	2,100	2,820	430	237	200	251	245
2	500	610	4,100	485	820	2,150	2,400	425	225	200	251	222
3	400	558	3,830	494	900	2,950	3,830	425	225	200	255	212
4	390	530	3,300	620	1,400	4,950	2,000	400	246	184	248	195
5	452	530	6,470	6,140	1,540	5,300	1,900	350	240	180	252	205
6	461	530	10,900	12,100	1,250	3,400	1,900	320	230	180	267	200
7	380	489	7,060	8,650	950	1,750	1,840	315	230	178	272	235
8	380	402	4,210	4,600	820	1,290	1,210	310	250	175	282	240
9	355	390	5,790	3,100	20,100	1,260	1,150	300	245	143	300	240
10	353	380	2,420	2,250	17,200	1,250	970	285	220	175	316	262
11	325	370	1,970	1,920	13,500	1,290	820	285	208	171	362	218
12	355	385	1,300	1,850	9,980	1,060	770	285	210	166	452	203
13	365	368	1,640	1,530	7,440	1,240	710	285	208	140	400	188
14	295	355	1,070	1,340	5,050	1,360	670	270	205	117	368	185
15	295	343	940	1,120	3,970	1,820	650	270	206	140	486	208
16	290	340	820	1,020	2,100	1,260	630	270	204	136	516	244
17	280	330	690	978	2,100	1,260	565	270	200	139	720	235
18	290	336	615	870	1,890	900	550	254	200	142	670	275
19	300	336	550	840	1,680	835	740	254	200	142	600	280
20	300	355	680	940	1,580	796	520	250	200	145	585	273
21	300	370	620	1,200	22,200	765	510	257	200	142	780	257
22	313	460	560	1,580	47,900	730	490	335	197	156	703	230
23	300	510	553	2,450	48,200	711	470	295	180	252	588	224
24	300	515	600	2,200	17,400	750	460	265	180	243	518	224
25	330	550	616	2,620	11,100	930	460	275	175	220	625	224
26	2,850	3,000	616	2,100	6,850	1,190	450	300	175	210	602	224
27	4,560	2,230	550	1,780	3,900	3,220	440	300	180	187	548	220
28	3,120	46,800	535	1,280	3,930	2,750	438	320	180	192	465	220
29	1,820	16,000	500	1,030	3,050	3,100	432	310	200	208	493	220
30	1,200	6,440	490	870	------	2,520	430	300	200	257	497	222
31	550	------	520	850	------	3,500	------	290	------	251	480	------

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Monthly discharge of Verde River near McDowell, Ariz., for the years ending Sept. 30, 1919 and 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	260	140	198	11,900
November	1,100	236	346	20,600
December	1,300	325	458	28,200
January	420	298	345	21,200
February	2,700	340	953	52,900
March	4,230	450	1,560	95,900
April	5,400	225	1,330	79,100
May	245	130	173	10,600
June	218	80	118	7,020
July	7,440	94	2,130	131,000
August	5,020	328	906	55,700
September	1,550	245	471	28,000
The year	7,440	80	749	542,000
1919-20				
October	4,560	280	741	45,600
November	46,800	330	2,850	170,000
December	10,900	490	2,230	137,000
January	12,100	485	2,240	138,000
February	48,200	820	8,960	515,000
March	5,300	711	1,880	116,000
April	3,820	430	1,040	61,900
May	430	250	305	18,800
June	250	175	209	12,400
July	257	117	180	11,100
August	780	248	456	28,000
September	280	185	228	13,600
The year	48,200	117	1,740	1,270,000

BEAVER CREEK AT CAMP VERDE, ARIZ.

LOCATION.—In sec. 30, T. 14 N., R. 15 E., a quarter of a mile above junction with Verde River and 1 mile northeast of Camp Verde, Yavapai County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 1, 1912, to March 31, 1920, when station was discontinued.

GAGE.—Inclined and vertical staff on right bank. Lower sections were destroyed by high water of February 22, 1920. Temporary staff gage at arbitrary datum used February 23 to March 31, 1920, when station was discontinued. On March 12, 1920, temporary gage found to read 0.9 foot lower than regular gage. Gage read by Mrs. A. L. Vyne. For description of previous gages used at this station see Water-Supply Paper 479, p. 177.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Bed composed of sand, clay, and solid rock; control changes considerably at high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 7.8 feet at 8 p. m., July 18 (discharge, 6,000 second-feet); minimum stage, 3.6 feet, May 23, 24, 27-31 (discharge, 2 second-feet).

Maximum stage during period October 1, 1919, to March 31, 1920, 16.7 feet at 8 a. m., February 22 (discharge, from extension of rating curve, about 28,000 second-feet); minimum stage, 2.65 feet at 10 a. m., February 18 (discharge, 4 second-feet).

1912-1920 (March 31): Maximum discharge that of February 22, 1920; minimum discharge, 1.5 second-feet, April 26-30, 1913.

DIVERSIONS.—Water is diverted for irrigation at several points above station; quantity unknown. A small amount of water is discharged into creek above gage at times by an irrigation ditch which diverts from Verde River above mouth of Beaver Creek.

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ACCURACY.—Stage-discharge relation changed considerably during floods, and probably affected at times by backwater from Verde River. Rating curves used applicable as follows: October 1, 1918, to July 17, 1919, well defined below 50 second-feet, poorly defined above; July 18 to September 30, 1919, poorly defined; 0.2 foot added to gage readings before applying previous rating; October 1 to November 27, 1919, poorly defined; 0.1 foot added to gage readings before applying standard rating; November 28, 1919, to February 22, 1920, fairly well defined below 1,600 second-feet, poorly defined above; February 23 to March 31, 1920, poorly defined; gage heights on temporary gage increased by 0.9 foot before applying to rating drawn parallel to previous standard curve. Gage read to half-tenths daily, oftener during high water. Daily discharge ascertained by applying mean daily gage height to rating table, and by averaging hourly discharge for days when stage fluctuated rapidly. Records fair for low stages and poor for high stages.

Discharge measurements of Beaver Creek at Camp Verde, Ariz., during the years ending September 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1918		*Feet*	*Sec.-ft.*	1919		*Feet*	*Sec.-ft.*
Dec. 8	J. F. Kunesh	3.93	13	Aug. 29	J. F. Kunesh	3.82	19
31	N. A. Vyne	4.0	17	Oct. 17	N. A. Vyne	3.80	11
1919				1920			
Feb. 19	J. F. Kunesh	4.07	22	Jan. 28	J. F. Kunesh	3.43	78
20	do	4.07	24	29	do	3.45	75
May 6	do	3.85	12	Mar. 12	do	[a] 3.40	389
June 16	N. A. Vyne	3.85	7.8	May 6	N. A. Vyne	[b] 2.8	9.8
July 31	do	3.80	15				
Aug. 29	J. F. Kunesh	3.82	17				

[a] Approximate, 2.53 feet on temporary gage installed to-day.
[b] Approximate, 1.30 feet on temporary gage.

Daily discharge, in second-feet, of Beaver Creek at Camp Verde, Ariz., for the period Oct. 1, 1918, to Mar. 31, 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918-19												
1	7	10	8	13	25	20	632	8	6	8	260	37
2	7	10	8	13	25	19	523	10	6	10	435	37
3	7	13	8	13	20	17	505	10	6	80	142	37
4	7	10	8	13	20	16	260	8	6	70	61	37
5	7	10	8	13	20	16	239	10	7	80	37	37
6	7	10	8	13	16	21	187	10	8	142	20	37
7	7	10	10	16	16	26	115	8	8	171	20	52
8	7	10	13	16	16	31	61	8	8	200	20	325
9	7	10	13	13	16	37	61	10	8	44	20	52
10	7	10	13	13	16	42	44	8	8	31		37
11	7	10	13	13	16	47	37	8	8	31		37
12	7	10	13	13	20	52	31	8	8	25		25
13	7	10	16	13	20	58	25	8	8	505		20
14	7	13	16	13	20	63	25	8	8	1,130		20
15	7	13	16	13	16	68	20	8	8	845		37
16	7	13	16	10	16	74	16	13	8	70		20
17	7	13	16	10	20	80	10	7	8	156		20
18	7	13	16	10	22	203	10	8	7	1,820		20
19	7	13	16	16	20	148	7	6	7	405	20	16
20	8	10	16	16	20	350	7	6	7	203		16
21	8	10	16	16	16	365	7	3	7	70		16
22	8	10	20	16	16	267	7	3	7	70		16
23	8	10	31	16	13	187	10	2	7	80		13
24	10	10	26	16	13	142	10	2	7	61		13
25	10	10	20	16	13	128	10	3	7	37		10
26	10	8	20	16	16	120	8	3	7	61		10
27	10	8	16	16	16	181	8	2	7	25		10
28	10	8	16	16	19	156	8	2	7	37		16
29	10	8	16	16	-------	405	8	2	7	25	18	16
30	10	8	16	16	-------	387	8	2	7	16	28	16
31	10	-------	16	20	-------	375	-------	2	-------	16	37	-------

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Daily discharge, in second-feet, of Beaver Creek at Camp Verde, Ariz., for the period Oct. 1, 1918, to Mar. 31, 1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1919-20							1919-20						
1	8	10	269	19	83	1,050	16	8	8	30	24	15	365
2	8	8	243	19	90	3,000	17	8	8	28	28	8	365
3	8	10	374	40	83	1,400	18	8	8	28	71	4	340
4	8	10	700	114	77	840	19	8	8	28	111	5	315
5	8	10	700	740	77	670	20	8	25	28	183	243	315
6	8	10	269	397	77	610	21	8	25	28	228	11,000	315
7	8	10	183	161	83	550	22	8	16	28	243	17,000	315
8	8	10	194	106	2,700	440	23	8	20	28	198	11,500	470
9	8	10	90	71	617	365	24	13	40	24	156	6,700	390
10	8	10	83	54	397	470	25	980	280	24	144	3,300	315
11	8	10	71	48	183	470	26	405	115	19	90	2,800	340
12	8	10	48	43	144	470	27	187	10,000	19	65	1,900	390
13	8	10	77	33	106	365	28	25	1,480	19	71	1,600	315
14	8	8	57	28	54	365	29	25	352	19	77	1,300	390
15	8	8	40	24	28	365	30	16	352	19	77	------	525
							31	13	------	19	71	------	670

NOTE.—No gage-height record and discharge interpolated Mar. 6–16, 1919. Discharge estimated July 8, 1919, no gage record. Braced figure shows mean discharge for period indicated for which no gage record was furnished.

Monthly discharge of Beaver Creek at Camp Verde, Ariz., for the period Oct. 1, 1918, to Mar. 31, 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	10	7	7.9	486
November	13	8	10.4	619
December	31	8	14.9	916
January	20	10	14.3	879
February	25	13	17.9	994
March	405	16	132	8,120
April	632	7	96.7	5,750
May	13	2	6.3	387
June	8	6	7.3	434
July	1,820	8	210	12,900
August	435	----------	47.7	2,930
September	325	10	35.2	2,090
The year	1,820	2	50.5	36,590
1919-20				
October	980	8	59.6	3,660
November	10,000	8	430	25,500
December	700	19	119	7,300
January	740	19	120	7,380
February	17,000	4	2,150	124,000
March	3,000	315	567	34,900
The period	----------	----------	----------	203,000

AGUA FRIA RIVER NEAR GLENDALE, ARIZ.

LOCATION.—In sec. 28, T. 6 N., R. 1 E., at uncompleted masonry diversion dam of Beardsley irrigation project, at Camp Dyer, 4 miles below mouth of Castle Creek and 22 miles northwest of Glendale, Maricopa County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 10, 1910, to September 30, 1920.

GAGE.—Stevens continuous water-stage recorder fastened to upstream face of dam near opening or gap in masonry at right bank until washed away by flood on November 27, 1919; staff gage fastened to damaged stilling well at same datum as recorder used thereafter; recorder inspected and staff gage read by Will Benson. (For record of earlier gages used see Water-Supply Paper 479, p. 179.)

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DISCHARGE MEASUREMENTS.—Made from cable about one-third of a mile below gage or by wading near gage.

CHANNEL AND CONTROL.—Channel composed of gravel and shifting sand. Principal control is formed by the unfinished portion of the masonry diversion dam and ledge on which it is built. This dam has a large gap or opening near the right bank through which the low and medium flow passes, a scour gate opening, 4 feet by 7½ feet, in the base near the left bank through which flow from the left channel passes at higher stages, and another gap or opening near the left bank that carries flow at still higher stages. At extreme high stages the stream flows over the entire broad crest of the dam which is at elevation 28.2 feet on the gage. Sand fills in and scours out of the crevices in the right gap of the dam continually with each rise in the river. The stage-discharge relation, therefore, is not permanent. On October 18, 1914, an artificial control was completed across this right opening but was partly destroyed by flood on January 29, 1915. It was repaired October 28, 1915, but was again partly destroyed during floods of January, 1916, and April, 1917. Flood of November 27, 1919, which reached a crest stage of 33 feet, or about 5 feet above top of dam, destroyed the upper portion of the stilling well and shelter and the water-stage recorder and scoured out the control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year ending September 30, 1919, 18.9 feet at 2 and 3 p. m., September 8 (discharge, 53,500 second-feet, from extension of rating curve); minimum discharge, 0.6 second-feet, September 24 to 26, 1919.

Maximum stage recorded during the year ending September 30, 1920, 33 feet at 2 p. m., November 27 (discharge, not determined with accuracy but estimated to be at least 100,000 second-feet from study of area and mean velocity). Stage corresponded to a depth of about 5 feet over crest of dam; minimum discharge, not determined.

1910–1920: Maximum stage on record, 33 feet, November 27, 1919, as given above, and January 27, 1916, determined from flood marks (discharge, about 105,000 second-feet, from extension of rating curve); minimum discharge, 0.6 second-foot, September 24 to 26, 1919. A minimum discharge of 2 second-feet has occurred at numerous times during the period of record.

DIVERSIONS.—Water is diverted above gage for irrigating two or three small ranches; amount not known.

ACCURACY.—Stage-discharge relation not permanent. Several rating curves covering short periods of time and defined by discharge measurements were used. These curves merge into the standard curve for shifting control method as used during 1918. Operation of water-stage recorder fairly satisfactory except as indicated in footnote to daily-discharge table. Water-stage recorder washed out during flood of November 27, 1919, and graphic record of stage for period October 7 to November 27, 1919, lost with water-stage recorder. Daily discharge October 1, 1918, to September 30, 1919 ascertained by applying mean daily gage height to rating table except as indicated in footnote to daily-discharge table. No daily discharge computed for year ending September 30, 1920, as base data were insufficient. Mean daily gage height determined by inspecting gage graph or, on days of considerable fluctuation, by averaging hourly gage heights. Records for year ending September 30, 1919, fair for low and medium stages; poor for high stages.

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Discharge measurements of Agua Fria River near Glendale, Ariz., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1918		*Feet*	*Sec.-ft.*	1919		*Feet*	*Sec.-ft.*
Oct. 13	C. E. Ellsworth	3.30	2.5	Sept. 1	J. F. Kunesh	4.37	65
30	do	3.32	2.6	Oct. 1	do	4.44	55
Nov. 19	Kunesh and Ellsworth	3.56	5.4	Dec. 16	do	1.66	127
Dec. 19	J. F. Kunesh	3.36	10	1920			
1919				Jan. 25	do	3.45	368
Jan. 28	do	3.21	5.0	25	do	3.39	343
28	do	3.21	5.1	Feb. 3	do	2.53	179
Feb. 13	do	4.27	170	29	do	5.69	752
23	do	3.84	77	Mar. 14	do	4.60	271
Mar. 21	do	3.77	61	June 6	do	3.48	12
Apr. 8	do	3.60	32	July 14	do	3.36	5.3
May 3	do	3.33	4.5	Sept. 13	C. W. Sopp	5.25	501
June 8	do	3.29	2.5	26	do	4.50	12
July 10	do	4.30	49				

Daily discharge, in second-feet, of Agua Fria River near Glendale, Ariz., for the year ending Sept. 30, 1919

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	3.7	4.4		9	1,430	58	69	7	7.0	2.5	340	67
2	3.7	4.4		9	835	55	65	6	3.0	2.5	3,100	42
3	3.7	4.4		9	540	53	57	6	2.8	168	1,420	34
4	3.7	4.4	34	8.5	335	50	52	6	2.8	47	340	14
5	3.7	4.4		8.5	205	48	48	6	2.8	20	161	15
6	3.7	4.4		9	124	47	43	6	2.8	344	116	15
7	3.0	4.4	152	9	113	48	38	6	2.8	89	92	49
8	3.0	4.4		8.5	111	48	34	6	2.8	27	79	4,930
9	3.0	4.4		8.5	111	48	45	6	2.8	18	66	450
10	3.0	4.4		8.5	111	48	44	6	2.8	60	53	152
11	3.0	4.4		8.5	113	48	39	6	2.8	132	40	60
12	3.0	4.4		8	205	48	36	6	2.8	1,510	27	28
13	3.0	5	21	8	170	50	33	6	2.8	430	22	18
14	3.0	86		8	143	50	29	6	2.8	980	20	19
15	3.0	164		8	118	52	25	4.2	2.8	1,180	18	18
16	3.0	50		7.5	96	57	25	2.5	2.8	480	100	12
17	5.5	28		7.5	82	57	22	2.5	2.8	1,900	139	9.5
18	8	16		7.5	80	55	20	2.5	2.8	890	100	4.2
19	11	8.5	11	7.5	80	57	19	2.5	2.8	960	73	1.2
20	13	6	12	7	78	57	17	2.5	2.8	480	42	.9
21	16	6	86	7	75	62	16	2.5	2.8	318	28	.9
22	17	6	86	7	75	62	14	2.8	2.8	272	27	.8
23	16	6	52	7	75	62	13	3.0	2.8	168	50	.8
24	10	175	36	6	73	60	12	2.8	2.8	116	42	.6
25	8.5	71	26	6	69	58	11	2.8	2.5	44	38	.6
26	8	47	20	6	67	57	9.5	2.8	2.5	16	39	.6
27	7.5	47	17	6	64	57	10	58	2.5	16	52	1,690
28	7	47	15	5.5	60	57	9.5	76	2.5	36	26	520
29	6.5	47	12	5	-------	52	8.5	34	2.5	385	23	166
30	4.4	34	12	5.5	-------	69	8	24	2.5	150	47	113
31	4.4	-------	9.5	-------	-------	71	-------	16	-------	62	184	-------

NOTE.—Recorder not operating Oct. 17–29, Jan. 22–25, Apr. 5–7, May 15, June 7, Aug. 2–4 (when a marked rise occurred), Aug. 8–11. Staff gage readings used to compute daily discharge Oct. 21–25 and 29. Pencil not marking graph Nov. 20–24, 26–28, Nov. 30 to Dec. 6 and Dec. 8–18, although recorder was operating. Clock stopped about midnight of Dec. 7 on which date a heavy rain was reported. Observer started clock but failed to lengthen pencil. Aug. 5, observer cleaned mud from well and reset recorder. Braced figures show mean discharge for period included. Discharge estimated Nov. 20–24, Nov. 26–28, 30, Feb. 1, and Aug. 2–4.

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Monthly discharge of Agua Fria River near Glendale, Ariz., for the year ending Sept. 30, 1919

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	17	3.0	6.29	387
November	175	4.4	30.1	1,790
December	152	9.5	31.7	1,950
January	13	5	7.71	474
February	1,430	60	201	11,200
March	71	47	54.9	3,380
April	69	8	29.0	1,730
May	76	2.5	10.5	646
June	7	2.5	2.89	172
July	1,900	2.5	364	22,400
August	3,100	18	223	13,700
September	4,930	.6	281	16,700
The year	4,930	.6	103	74,500

Daily gage height, in feet, of Agua Fria River near Glendale, Ariz., for the year ending Sept. 30, 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	4.45			1.25	2.5	5.7	4.35	3.8	3.55	3.35	*4.0	4.55
2	4.45			1.25	2.75	5.6	4.35	3.8	3.55	3.35	3.9	4.5
3	4.35			1.25	2.55	5.5	4.3	3.8	3.5	3.35	3.75	4.5
4	4.3			*10.5	2.5	5.4	4.3	3.8	3.5	3.35	4.0	4.5
5	4.25			*12.4	2.35	5.3	4.25	3.8	3.5	3.35	3.95	*5.2
6	4.15			*5.9	2.25	5.15	4.25	3.8	3.5	3.35	3.75	4.9
7				4.5	2.2	5.1	4.2	3.75	3.45	3.3	3.7	4.7
8				4.45	2.3	5.0	4.2	3.75	3.45	3.3	*4.7	4.7
9				4.3	5.4	4.9	4.15	3.75	3.45	3.3	4.0	4.65
10				4.05	*7.5	4.9	4.15	3.75	3.45	3.3	*4.05	4.65
11				4.45	*6.7	*5.15	4.1	3.7	3.45	3.3	4.1	4.65
12				4.25	5.4	4.75	4.1	3.7	3.45	3.3	4.0	4.65
13				4.0	4.7	4.55	4.1	3.7	3.45	3.3	*4.45	*6.25
14				3.85	4.4	4.5	4.05	3.7	3.45	3.35	5.2	5.0
15				3.9	4.15	4.4	4.05	3.7	3.45	3.4	4.45	4.65
16			1.65	3.95	3.95	4.4	4.05	3.7	3.4	3.4	4.2	4.55
17			1.6	3.9	3.7	4.35	4.05	3.7	3.4	3.35	*5.25	*4.8
18			1.55	4.0	3.55	4.35	4.05	3.7	3.4	3.35	4.55	4.75
19			1.55	4.0	3.4	4.3	4.05	3.7	3.4	3.3	*3.75	4.6
20			1.5	4.0	3.5	4.25	4.0	3.65	3.4	3.3	4.3	4.5
21			1.45	4.0	*12.4	4.2	4.0	3.75	3.4	3.3	4.2	4.5
22			1.45	3.95	13.7	4.2	4.0	3.75	3.4	3.9	4.0	4.5
23			1.4	3.8	*9.45	4.2	4.0	3.9	3.4	3.6	4.05	4.5
24			1.4	3.65	7.6	4.5	3.95	3.85	3.35	3.5	*4.4	4.5
25			1.35	3.45	7.05	4.4	3.9	3.75	3.35	3.4	*8.4	4.5
26			1.3	3.25	6.6	4.45	3.85	3.7	3.4	3.35	4.95	4.5
27		*27.0	1.3	3.1	6.2	4.5	3.85	3.7	3.4	3.35	4.8	4.5
28			1.25	2.9	5.9	4.45	3.85	3.65	3.4	3.6	4.7	4.5
29			1.25	2.75	5.6	4.4	3.85	3.6	3.4	*4.6	4.65	4.5
30			1.25	2.6	-------	4.35	3.85	3.6	3.4	3.85	4.6	4.5
31			1.25	2.5	-------	4.35	-------	3.7	-------	3.9	4.55	-------

* Mean of several readings.

NOTE.—Oct. 7 to Nov. 27, graph record lost when recorder washed away in flood on Nov. 27. No record Nov. 28 to Dec. 15. Water began to overflow top of dam 7 a. m. Nov. 27 (gage height, 28.2 feet); 2 p. m., crest stage about 5 feet over top of dam (gage height, about 33 feet); 6 p. m., water still 2 feet over top of dam (gage height about 30 feet) and receding rapidly. Nov. 28, stage had fallen to gage height 12 to 15 feet. Flood started sometime during night of Nov. 27, probably after midnight, according to observer.

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BARREN FLAT BASIN

WEST TURKEY CREEK NEAR LIGHT, ARIZ.

LOCATION.—In SW. ¼ sec. 17, T. 18 S., R. 29 E., at Sanders' ranch, 2½ miles south and 9½ miles east of Light, Cochise County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 30, 1919, to September 30, 1920.

GAGE.—Vertical enamel staff on right bank directly north of Sanders' ranch; read by R. V. Sanders.

DISCHARGE MEASUREMENTS.—Measurements made by wading near gage.

CHANNEL AND CONTROL.—Low-water control 20 feet below gage; high-water control 100 feet below gage. Banks high, not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge for period July 30, 1919, to September 30, 1919, 210 second-feet on August 2; minimum mean daily discharge 0.5 second-foot on September 5.

Maximum mean daily discharge for year ending September 30, 1920, 600 second-feet on November 23; minimum mean daily discharge trace of water only June 28 to August 16 and September 16-30.

DIVERSIONS.—Minor diversions above and below station.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curve fairly well defined between 0 and 30 second-feet. Gage read twice daily to hundredths and oftener during flood periods. Daily discharge ascertained by applying mean daily gage height to rating tables and by hydrograph during flood periods, except for periods June 28 to August 16, 1920, and September 16-30, 1920, when there was a trace of water only. Records fair.

COOPERATION.—Discharge measurements and record of daily discharge furnished by University of Arizona. Prof. G. E. P. Smith, irrigation engineer.

Discharge measurements of West Turkey Creek near Light, Ariz., during the period July 30, 1919, to Sept. 30, 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft.*	1920		*Feet*	*Sec.-ft.*
July 30	Kunesh and Schwalen	1.30	8.4	Jan. 11	Schwalen and Kunesh	0.81	12.0
31	do	1.38	11.9	Feb. 25	Schwalen and Smith	1.18	25.7
Aug. 24	Smith and Schwalen	.85	2.4	June 8	W. E. Code	.17	.17
Nov. 19	H. C. Schwalen	.86	2.2	Aug. 17	H. C. Schwalen	.04	.10

Daily discharge, in second-feet, of West Turkey Creek near Light, Ariz., for the period July 30, 1919, to Sept. 30, 1920

Day	July	Aug.	Sept.	Day	July	Aug.	Sept.	Day	July	Aug.	Sept.
1919				1919				1919			
1		20	2	11		8	5	21		3	1
2		210	2	12		7	8	22		2	1
3		25	1	13		10	2.5	23		2	1
4		11	1	14		5	2	24		2.5	1
5		10	.5	15		5.5	1.5	25		2.5	1
6		8	1	16		6	1.5	26		2.5	2
7		9	11	17		5	1.5	27		2	2.5
8		9.5	11	18		5	1.5	28		2	2.5
9		13	7	19		3.5	1.5	29		8	2.5
10		9	7	20		3.5	1	30	9	2	2
								31	10	2	

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Daily discharge, in second-feet, of West Turkey Creek near Light, Ariz., for the period July 30, 1919, to Sept. 30, 1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Aug.	Sept.
1919-20											
1	2	2	41	3.5	12	16	17	9	1		6.5
2	2	2	49	4	12	14	17	9	1		5.5
3	2	2	37	5	12	13	17	9	1		5.5
4	1.5	2	37	8	11	13	17	8.5	1		5
5	1.5	2	36	9	15	11	17	8.5	1		4.5
6	1.5	2	36	9.5	16	9.5	17	8.5	1		4
7	1.5	2	31	10	16	8.5	17	8.5	1		3
8	1	2.5	18	11	17	8.5	17	9	1		3
9	1	2	16	12	16	10	17	10	1		3
10	2.5	2	16	14	17	12	17	8.5	1		2
11	4	2	14	14	17	13	16	6	1		2
12	4	2	13	14	17	11	14	5	1		1.5
13	4	2	11	13	18	11	13	4	.5		1
14	4	1.5	10	11	18	11	12	3.5	1		1
15	3.5	1.5	8.5	15	18	10	11	3	.5		.5
16	3.5	2	7	14	19	10	10	3	1		
17	4	2	6.5	15	21	10	10	3	1	3	
18	2.5	2.5	6	16	23	10	10	2.5	.5	6	
19	13	2.5	5.5	26	25	9	9	2.5	1	15	
20	14	2.5	5.5	27	26	9.5	9	2	.5	43	
21	15	37	5	26	26	8.5	22	2	.5	16	
22	11	325	5	17	26	8	20	2	.5	13	
23	11	600	4.5	18	26	8	18	2	.5	9.5	
24	12	390	4	22	26	7	18	1.5	.5	12	
25	13	215	4	17	25	7.5	9	1.5	.5	11	
26	2.5	110	3.5	16	20	8.5	9.5	1.5	.5	9.5	
27	2.5	65	3.5	14	19	9	9	1.5	.5	11	
28	2.5	50	3	14	17	9.5	9	1.5		9	
29	2	40	3	13	16	10	9.5	1		8	
30	2	40	3	13		9.5	9	1		8	
31	2		2	13		10		1		7	

Monthly discharge of West Turkey Creek near Light, Ariz., for the period July 30, 1919, to Sept. 30, 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
July 30-31			9.5	38
August	210	2	13.3	818
September	11	.5	2.7	161
The period				1,020
1919-20				
October	15	1	4.8	295
November	600	1.5	63.8	3,800
December	43	2	14.1	867
January	27	3.5	14.0	861
February	26	11	18.9	1,090
March	16	7	10.2	627
April	22	9	13.9	827
May	10	1	4.5	277
June	1		.7	42
August	43		5.8	357
September	6.5		1.6	95
The year	600		12.6	9,140

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POST CREEK AT FORT GRANT, ARIZ.

LOCATION.—In NE. ¼ sec. 25, T. 9 S., R. 23 E., at Fort Grant, Coch

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 4, 1920, to September 30, 1920, when discontinued.

GAGE.—Vertical enamel staff on left bank.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Channel composed of large boulders and straight and fairly uniform in cross section.

EXTREMES OF DISCHARGE.—Maximum daily mean discharge during p 4 to September 30, 1920, 47 second-feet May 10 and 11; minim for long period.

DIVERSIONS.—Small quantity diverted above gage for irrigation.

COOPERATION.—Discharge measurements and record of daily dischar by University of Arizona, Prof. G. E. P. Smith, irrigation engin

Discharge measurements of Post Creek at Fort Grant, Ariz., during the p to Sept. 30, 1920.

Date	Made by—	Gage height	Discharge	Date	Made by—
		Feet	*Sec.-ft.*		
Mar. 5	H. C. Schwalen	4.54	19.6	Apr. 14	H. C. Schwalen
16	do	1.42	11.3	June 9	W. E. Code

Daily discharge, in second-feet, of Post Creek at Fort Grant, Ariz., for th Mar. 4 to Sept. 30, 1920.

Day	Mar.	Apr.	May	June	Day	Mar.	Apr.
1		16	33	5	16	11	26
2		16	40	.5	17	13	26
3		16	33	1.5	18	13	26
4	20	16	26	1	19	11	26
5	19	16	26	1	20	13	16
6	17	16	26	.5	21	10	16
7	16	21	33	.5	22	12	16
8	16	26	40	.5	23	13	16
9	15	26	40		24	16	16
10	17	26	47		25	16	21
11	16	21	47	.5	26	13	21
12	15	21	26	.5	27	10	21
13	14	21	26	.5	28	10	21
14	12	13	16	.5	29	10	26
15	12	26	16	.5	30	13	33
					31	16	

NOTE.—No flow on days when no discharge was given except June 9, 10, 24–26, 28–30, trace of water only

Monthly discharge of Post Creek at Fort Grant, Ariz., for the period Sept. 30, 1920

Month	Discharge in second-	
	Maximum	Minimum
March 4–31	20	10
April	33	13
May	47	6
June	20	
The period		

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WHITEWATER BASIN

WHITEWATER DRAW NEAR RUCKER, ARIZ.

LOCATION.—In sec. 29, T. 19 S., R. 29 E., at Heyne ranch, 6 miles east of Rucker, Cochise County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 7, 1919, to September 30, 1920.

GAGE.—Vertical enamel staff fastened to tree on left bank; read by A. E. Mann and F. W. Heyne.

DISCHARGE MEASUREMENTS.—Made from cable 100 feet below gage or by wading near gage.

CHANNEL AND CONTROL.—Channel composed of boulders, gravel, and bedrock, with pronounced drop 300 feet below gage. Channel fairly straight and fairly uniform in cross-section.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge for period August 7 to September 30, 1919, 62 second-feet on September 29; minimum discharge 2 second-feet September 1–5.

Maximum mean daily discharge for year ending September 30, 1920, 1,240 second-feet November 23; minimum discharge zero August 1–12.

DIVERSIONS.—Minor diversions above and below station.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curve fairly well defined between 0 and 260 second-feet. Gage read to nearest hundredths twice daily and oftener during flood periods. Daily discharge ascertained by applying mean daily gage height to rating tables, and by hydrograph during flood periods, except for periods June 25–30 and July 4–31, 1920, when there was a trace of water only, and August 1–12, 1920, when stream was dry. Records good.

COOPERATION.—Discharge measurements and record of daily discharge furnished by University of Arizona, Prof. G. E. P. Smith, irrigation engineer.

Discharge measurements of Whitewater Draw near Rucker, Ariz., during the period Aug. 7, 1919, to Sept. 30, 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft.*	1920		*Feet*	*Sec.-ft.*
Aug. 7	Schwalen and Kunesh	1.28	22.3	Jan. 10	H. C. Schwalen	0.52	6.4
25	Schwalen and Smith	.88	4.3	Feb. 25	do	.94	31.0
Nov. 19	H. C. Schwalen	.81	2.5	June 8	W. E. Code	.28	1.0
				Aug. 17	H. C. Schwalen	.37	2.0

Daily discharge, in second-feet, of Whitewater Draw near Rucker, Ariz., for the period Aug. 7, 1919, to Sept. 30, 1920

Day	Aug.	Sept.	Day	Aug.	Sept.	Day	Aug.	Sept.
1919			1919			1919		
1		2	11	19	10	21	5	2.5
2		2	12	13	9	22	4.5	2.5
3		2	13	7	8.5	23	4.0	2.5
4		2	14	11	6.0	24	3.5	2.5
5		2	15	5	5	25	4	3
6		2.5	16	6	5	26	22	7
7	21	15	17	7.5	4.5	27	4.5	50
8	21	22	18	6	4	28	4	48
9	20	15	19	5.5	3	29	3.5	62
10	20	12	20	7	3	30	4	31
						31	2.5	

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Daily discharge, in second-feet, of Whitewater Draw near Rucker, Ariz., for the period Aug. 7, 1919, to Sept. 30, 1920—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919-20												
1	30	4	67	4	13	14	8.5	8	0.5	0.5		7
2	28	3.5	64	4	12	12	8.5	7	.5	.5		6
3	26	3.5	60	6	9.5	10	9.5	6.5	1	.5		5.5
4	15	3.5	56	7.5	8.5	10	10	6.5	1			4.5
5	4	3	48	9	8.5	9.5	11	6.5	1			5
6	4.5	3	44	12	8.5	9	11	6	1			5.5
7	4.5	3	37	12	8.5	8.5	10	5.5	.5			3.5
8	4	3	33	9	9	8.5	10	5.5	.5			3
9	3.5	3	30	6	85	8.5	10	5	.5			2.5
10	3.5	3	28	6.5	90	8.5	9	5	.5			2
11	5.5	3	25	6.5	58	8	9	5	.5			2
12	27	3	20	7	48	8	8.5	5.5	1			1.5
13	19	3	16	7	32	7	8.5	5	.5		26	1
14	14	2.5	15	13	26	6.5	8	4	.5		20	1.5
15	12	2.5	14	11	22	5.5	8	3.5	.5		10	1
16	8.5	2.5	12	10	19	5.5	7.5	3.5	.5		5	1
17	7	2.5	9	12	16	5.5	7	3	.5		2.5	.5
18	6	2.5	9	18	15	5	7	3	.5		1	.5
19	6	2.5	8.5	26	13	5	7	3	.5		3.5	.5
20	5.5	3	8	28	16	4.5	7	3	.5		6	.5
21	5	23	7	50	95	4.5	8	2.5	.5		26	3.5
22	5	695	6.5	74	87	4.5	9	2.5	.5		20	1
23	4.5	1,240	6.5	61	56	4.5	9	2.5	.5		15	.5
24	4.5	360	6	38	45	5	9	2	.5		15	.5
25	5	184	5	28	32	5.5	10	2			24	.5
26	5	184	5	23	27	6	10	2			26	.5
27	5	77	4	20	23	7	10	1			21	.5
28	5	80	3.5	17	20	7	9	1			15	.5
29	4.5	89	3.5	15	17	6.5	8	1			10	.5
30	4	78	4	14		7	8	1			9.5	.5
31	4		4	13		7		.5			8	

Monthly discharge of Whitewater Draw near Rucker, Ariz., for the period Aug. 7, 1919, to Sept. 30, 1920

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
August 7-31	22	2.5	9.6	457
September	62	2	11.5	684
The period				1,140
1919-20				
October	30	3.5	9.2	565
November	1,240	2.5	102	6,070
December	67	3.5	21.2	1,300
January	74	4	18.3	1,130
February	95	8.5	31.7	1,830
March	14	4.5	7.2	443
April	11	7	8.8	524
May	8	.5	3.8	234
June	1		.48	29
July	.5		.05	3
August	26	0	8.5	523
September	7	.5	2.1	125
The year	1,240	0	17.6	12,800

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WHITEWATER DRAW NEAR DOUGLAS, ARIZ.

LOCATION.—In sec. 10, T. 24 S., R. 27 E., opposite city pumping plant, a quarter of a mile above highway bridge and El Paso & Southwestern Railroad bridge, 1 mile above electric railway bridge, and 1¼ miles west of Douglas, Cochise County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 24 to October 10, 1911, at electric railway bridge; July 21, 1912, to February 15, 1916, at highway bridge; and February 16, 1916, to September 30, 1920, at present location.

GAGE.—Vertical and inclined staff on right bank opposite city pumping plant; read by Mrs. L. E. King, and Mrs. Joseph Harris. For description of previous gages used at station, see Water-Supply Paper 479, p. 183.

DISCHARGE MEASUREMENTS.—Made from cable near gage or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel; shifts frequently. Slag dumped into the channel below gage causes backwater at gage and scours out at high water.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, 14.5 feet about 8 p. m., July 28 (estimated discharge, 4,050 second-feet); minimum discharge less than 0.5 second-foot for long periods between floods.

Maximum stage during year ending September 30, 1920, 13.3 feet at 7 a. m., November 23 (estimated discharge, 3,400 second-feet); minimum discharge, less than 0.5 second-foot for long periods between floods.

1911–1920: Maximum stage recorded, 14.5 feet about 8 p. m., July 28, 1919 (estimated discharge, 4,050 second-feet). Stream dry or carries less than 0.5 second-foot a great part of each year.

DIVERSIONS.—Some flood water is diverted above station for irrigation, quantity unknown.

ACCURACY.—Stage-discharge relation changes frequently with each sudden rise. During year ending September 30, 1919, several high-water discharge measurements were secured and used to prepare monthly estimates as given in monthly-discharge table. Data secured for year ending September 30, 1920, not sufficient to estimate monthly discharge. Gage read to half-tenths twice a week, and twice daily or oftener during floods. On account of the extremely flashy character of the flow, the assumption that the average of the observed gage heights was the mean for the day may cause considerable error. Daily discharge, on which monthly estimates for year ending September 30, 1919, are based, were determined by applying mean daily gage height to rating table or by averaging hourly discharge for days when stage fluctuated rapidly. Records for 1919 fair.

Discharge measurements of Whitewater Draw near Douglas, Ariz., during the years ending Sept. 30, 1919 and 1920

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1919		*Feet*	*Sec.-ft.*	1919		*Feet*	*Sec.-ft.*
Jan. 10	J. F. Kunesh	3.51	0.5	Aug. 6	Kunesh and Schwalen	3.73	1.2
May 23	do	3.48	.2	25	Smith and Schwalen	3.67	.7
July 21	do	4.62	2.5	Nov. 18	H. C. Schwalen		*.2
21	do	5.12	57				
22	do	4.67	2.6	1920			
July 29	French and Julian	8.25	1,410	May 23	W. E. Code		*.2
29	do	9.18	1,100	July 4	H. C. Schwalen	3.75	*.5
31	do	8.10	977	Aug. 8	do	3.80	.6
Aug. 1	Julian and Salo	5.45	161	Sept. 17	C. W. Sopp	3.75	.35

* Estimated.

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Monthly discharge of Whitewater Draw near Douglas, Ariz., for the year ending Sept. 30, 1919

Month	Discharge in second-feet (Mean)	Run-off in acre-feet	Month	Discharge in second-feet (Mean)	Run-off in acre-feet
October	3.09	190	May	0.20	12.3
November	.89	53	June	10.6	631
December	2.46	151	July	342	21,000
January	.40	24.6	August	46.0	2,830
February	.40	22.2	September	16.8	1,000
March	.30	18.4			
April	1.11	66.0	The year	35.9	26,000

NOTE.—See "accuracy" paragraph.

Daily gage height, in feet, of Whitewater Draw near Douglas, Ariz., for the year ending Sept. 30, 1920

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1			4.02	3.73	3.75		3.75			3.75	3.8	
2		3.84	3.85					3.75			3.9	3.75
3	3.75		3.78						3.75			
4			3.75	3.88		3.75	3.75	3.75		3.75	4.1	
5	3.75			3.82	3.75				3.75		3.85	3.85
6		3.80										4.2
7			3.75			3.75						4.3
8				3.75	3.75		3.75	3.75		3.75	3.9	3.9
9	3.75	3.80										3.8
10									3.75		4.6	
11	4.22		3.75	3.75		3.75	3.75	3.75		3.75	3.9	
12	5.18				3.75						3.85	3.75
13	4.32	3.80							3.75		5.1	
14	4.10		3.7	3.85		3.75					4.3	
15	3.92			4.1	3.75		3.75	3.75		3.75	3.8	
16	3.88	3.90		4.25							3.8	3.75
17				4.02					3.75			
18		4.0	3.7	3.9		3.75	3.75	3.75		3.75		
19	3.84	4.0		3.8	3.75						4.3	3.75
20				3.75					3.75		3.95	
21			3.7			3.75					4.1	
22		9.15		3.75	3.75		3.75	3.75		3.75	4.45	
23		11.9								6.1	3.9	3.75
24	3.84	6.35							3.75	3.8	3.95	
25		5.82	3.75	3.8		3.75	3.75	3.75		3.75	3.9	
26	3.84	4.52			3.75						3.8	3.75
27		4.15							3.75	3.8		
28		4.55	3.75			3.75						
29		4.78		3.75	3.75		3.75	3.75		3.8	3.75	
30	3.84	4.42										3.75
31												

NOTE.—See "accuracy" paragraph.

MISCELLANEOUS MEASUREMENTS

In addition to the records of flow obtained at the gaging stations and reported in the preceding pages, many measurements were made at other points, as shown by the following table:

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Miscellaneous discharge measurements in Colorado River drainage basin during the years ending Sept. 30, 1919 and 1920

Colorado River and tributaries above Green River

Date	Stream	Tributary to or diverting from—	Locality	Gage height	Discharge
				Ft.	*Sec.-ft.*
1920 Apr. 20	Snake River	Blue River	Mouth, Dillon, Colo	0.34	12.7
1919 Jan. 3	Homestake Creek	Eagle River	Mouth, Redcliff, Colo		17.8
Aug. 29	Gunnison River	Colorado River	200 feet above North Fork, in sec. 6, T. 15 S., R. 93 W. Colo.		160
1920 Sept. 17	do	do	do		95
1919 Aug. 30	do	do	Delta, Colo		153
1920 Sept. 18	do	do	do		227
1919 July 18	Lake Fork	Gunnison River	Outlet of Lake San Cristobal, Colo.		311
Nov. 9	do	do	do		24.4
Aug. 29	North Fork of Gunnison River.	do	Mouth, sec. 6, T. 15 S., R. 93 W., Colo.		28
1920 Sept. 17	do	do	do		91
1919 Aug. 14	Silver Creek	Dolores River	Mouth, Rico, Colo		7.1
Sept. 26	do	do	do		3.6
Dec. 17	do	do	do		2.0
1920 Jan. 27	do	do	do		1.7
May 12	do	do	do		22.5
July 17	do	do	do		10.3
1918 Oct. 24	Pack Creek	Mill Creek	Sec. 7, T. 26 S., R. 22 E., half a mile above mouth at Moab, Utah.	.81	5.7
1919 Jan. 27	do	do	do	.90	6.0
Apr. 2	do	do	do	.41	.5
28	do	do	do	.48	.5
June 2	do	do	do		.8

Green River and tributaries

1919 June 19	Pine Creek	New Fork	Outlet of Fremont Lake, Wyo.	2.20	254
Sept. 10	do	do	do	1.46	52
June 19	Fremont canal	Pine Creek	do	.60	7.2
Sept. 10	do	do	do	.45	3.4
1920 June 16	do	do	do	.85	19.2
1919 Sept. 26	Ashley Creek	Green River	Sec. 30, T. 3 S., R. 21 E., at intake of Vernal city water supply, a quarter of a mile above Dry Fork, near Vernal, Utah.	1.00	51
1920 May 28	Vernal Milling & Light Co.'s power canal.	Ashley Creek	Sec. 18, T. 3 S., R. 21 E., above penstock of power plant near Vernal, Utah.		31.8
1918 Nov. 17	Currant Creek	Strawberry River	Sec. 22, T. 3 S., R. 9 W., Uinta special base and meridian, in Wasatch County, 4 miles southwest of Fruitland, Duchesne County, half a mile below Deep Creek, Utah.	4.35	37.2

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Miscellaneous discharge measurements in Colorado River drainage basin during the years ending Sept. 30, 1919 and 1920—Continued

Green River and tributaries—Continued

Date	Stream	Tributary to or diverting from—	Locality	Gage height	Discharge
				Ft.	*Sec.-ft.*
1919 Jan. 17	Currant Creek	Strawberry River	Sec. 22, T. 3 S., R. 9 W., Uinta special base and meridian, in Wasatch County, 4 miles southwest of Fruitland, Duchesne County, half a mile below Deep Creek, Utah.	4.40	24.7
May 18	do	do	do	5.50	201
Sept. 20	do	do	do	4.13	24.5
Dec. 7	do	do	do	4.24	33.3
1920 Mar. 7	do	do	do	4.08	15.0
7	do	do	do	4.20	28.6
May 23	do	do	do	6.80	439
1918 Oct. 31	Cottonwood Creek	Duchesne River	Sec. 2, T. 4 S., R. 4 W., 500 feet above highway bridge 5 miles east of Duchesne, Utah.	.53	[1] .25
1920 Mar. 10	do	do	do		0
1919 Sept. 22	United States Lake Fork canal.	Lake Fork	NE. ¼ SW. ¼ sec. 32, T. 1 N., R. 4 W., near Mountain Home, Utah.	.83	38.6
24	Cedarview canal	Uinta River	SE. ¼ sec. 31, T. 2 N., R. 1 W., at head, near Neola, Utah.	.67	9.6
1918 Nov. 11	Farm Creek	do	SE. ¼ sec. 2, T. 1 N. R. 1 W., near Whiterocks, Utah.	7.62	2.5
1920 Mar 21	do	do	do	7.58	1.8
1918 Nov. 7	Henry Jim canal	do	Sec. 35, T. 2, S., R. 1 E., at head, a mile south of Fort Duchesne, Utah.	.24	1.0

Virgin River basin

1920 Apr. 19	Savage canal	Leeds Creek	Sec. 36, T. 40 S., R. 14 W., at head, near Leeds, Utah.		3.9
1918 Nov. 4	Muddy River	Virgin River	Sec. 13, T. 17 S., R. 68 E., at former gaging station "Muddy River near St. Thomas, Nev."	.90	7.2

Gila River and tributaries

1919 May 28	Gila River	Colorado River	Discontinued U. S. Geol. Survey gaging station at Winkleman, Ariz.	2.82	85
June 12	do	do	do	2.36	33
1920 June 10	do	do	do		40
1919 Jan. 29	do	do	At highway bridge 2 miles northwest of Florence, Ariz.		110
June 12	do	do	do		6.4
Dec. 5	Wood Canyon Creek	San Simon Creek	San Simon, Ariz.	.98	6.2
1920 Feb. 12	do	do	do	.92	4.4

[1] Discharge estimated.

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Miscellaneous discharge measurements in Colorado River drainage basin during the years ending Sept. 30, 1919 and 1920—Continued

Gila River and tributaries—Continued

Date	Stream	Tributary to or diverting from—	Locality	Gage height	Discharge
				Ft.	*Sec.-ft.*
1919					
Jan. 21	San Carlos River	Gila River	Highway bridge 3 miles above mouth of river, near San Carlos, Ariz.		27
Feb. 7	do	do	do		170
25	do	do	do		213
Mar. 15	do	do	do		90
Apr. 24	do	do	do		18
May 15	do	do	do		6.2
29	do	do	do		9.1
June 14	do	do	do		5.6
July 4	do	do	do		56
Aug. 22	do	do	do		10
1920					
Feb. 5	do	do	do		46
25	do	do	do		203
Mar. 16	do	do	do		46
June 11	do	do	do		7.3
1919					
Apr. 6	do	do	Railroad bridge 1 mile above mouth of river, near San Carlos, Ariz.		35
Aug. 9	San Pedro River	do	Hereford, Ariz	5.10	88
9	do	do	do	5.20	90
28	do	do	do	5.10	14.1
Nov. 17	do	do	do	4.90	5.5
1920					
Jan. 9	do	do	do	5.40	54
17	do	do	do	5.71	179
17	do	do	do	5.70	174
May 24	do	do	do	4.80	4.2
June 27	do	do	do	4.69	2.1
Aug. 7	do	do	do	4.79	11.7
1919					
Mar. 14	do	do	Highway bridge 2 miles west of Mammoth, Ariz.		0
Apr. 21	do	do	do		0
May 15	do	do	do		0
28	do	do	do		127
31	do	do	do		0
June 14	do	do	do		0
1920					
Feb. 7	do	do	do		71
Mar. 18	do	do	do		14
1919					
Apr. 21	do	do	Mouth of Arivaipa Creek, near Feldman, Ariz.		11
May 28	do	do	Mouth, Winkleman, Ariz.		2.6
Jan. 16	East side ditch	Diverts from San Pedro River.	Boquillas ranch near Fairbank, Ariz.		8.9
Feb. 21	do	do	do		6.2
Mar. 21	do	do	do		5.8
Apr. 23	do	do	do		6.0
May 22	do	do	do		0
Mar. 26	West side ditch	do	do		4.3
Apr. 23	do	do	do		3.4
May 22	do	do	do		2.1
June 22	do	do	do		.9
1918					
Dec. 5	Mineral Creek	Gila River	Mouth, Kelvin, Ariz.		4.0

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Miscellaneous discharge measurements in Colorado River drainage basin during the years ending Sept. 30, 1919 and 1920—Continued

Gila River and tributaries—Continued

Date	Stream	Tributary to or diverting from—	Locality	Gage height	Discharge
				Ft.	*Sec.-ft.*
1919					
Feb. 6	Mineral Creek	Gila River	Mouth, Kelvin, Ariz.		54
24	do	do	do		44
Mar. 14	do	do	do		7.4
20	do	do	do		13
Apr. 4	do	do	do		7.3
6	do	do	do		7
30	do	do	do		3.7
May 13	do	do	do		2.5
28	do	do	do		2.1
June 12	do	do	do		.86
July 4	do	do	do		.5
Sept. 26	do	do	do		2.7
Oct. 2	do	do	do		1.9
Dec. 10	do	do	do		68
14	do	do	do		15
24	do	do	do		6.8
1920					
Jan. 22	do	do	do		17
Feb. 5	do	do	do		9.6
24	do	do	do	2.95	101
Mar. 16	do	do	do	2.70	21
June 11	do	do	do		3.4
July 11	do	do	do		.7
1919					
Apr. 3	Florence canal	Diverts from Gila River.	10 miles by river above Florence, Ariz.	3.13	285
3	O. T. canal	do	do	2.61	35
Mar. 20	Queen Creek	Gila River	Dam site 1 mile above U. S. Geol. Survey gaging station near Superior, Ariz.		9.5
Jan. 29	Salt River	do	Highway bridge at Tempe, Ariz.		108
Aug. 22	Black River	Salt River	Discontinued U. S. Geol. Survey gaging station near Fort Apache, Ariz.	8.64	330
Apr. 26	White River	do	Discontinued U. S. Geol. Survey gaging station at Wanslee's ranch, near Fort Apache, Ariz.	3.78	1,070
Aug. 22	do	do	do	2.41	150
1920					
Feb. 3	Agua Fria River	Gila River	At and above mouth of Black Canyon Creek, near Canon, Ariz.		53
3	Black Canyon Creek	Aqua Fria River	Mouth, near Canon, Ariz.		76
1919					
Apr. 11	Hassayampa River	Gila River	9 miles below Wickenberg, Ariz.		2.5

Barren Flat basin

1919					
July 31	Rock Creek	West Turkey Creek	Light, Ariz.	1.11	11.7
Aug. 24	do	do	do	.96	.14
1920					
Jan. 11	do	do	do	1.34	7.7
Feb. 26	do	do	do	1.35	8.1

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HUBERT WORK, Secretary

UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

WATER-SUPPLY PAPER 510

SURFACE WATER SUPPLY OF THE UNITED STATES

1919–1920

PART X. THE GREAT BASIN

NATHAN C. GROVER, Chief Hydraulic Engineer

A. B. PURTON, H. D. McGLASHAN, F. F. HENSHAW, C. G. PAULSEN, and ROBERT FOLLANSBEE, District Engineers

Prepared in cooperation with the States of
UTAH, NEVADA, CALIFORNIA, OREGON, WYOMING, and IDAHO

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SURFACE WATER SUPPLY OF THE GREAT BASIN, 1919–1920.

AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of 14 reports presenting records or measurements of flow made on streams in the United States during the years ending September 30, 1919 and 1920.

The data presented in these reports were collected by the United States Geological Survey under the following authority contained in the organic law (20 Stat. L., p. 394):

> *Provided*, That this officer [the Director] shall have the direction of the Geological Survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

The work was begun in 1888 in connection with special studies relating to irrigation in the arid West. Since the fiscal year ending June 30, 1895, successive sundry civil bills passed by Congress have carried the following item and appropriations:

> For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

Annual appropriations for the fiscal years ending June 30, 1895–1921.

1895	$12,500.00
1896	20,000.00
1897 to 1900, inclusive	50,000.00
1901 to 1902, inclusive	100,000.00
1903 to 1906, inclusive	200,000.00
1907	150,000.00
1908 to 1910, inclusive	100,000.00
1911 to 1917, inclusive	150,000.00
1918	175,000.00
1919	148,244.10
1920	175,000.00
1921	180,000.00

In the execution of the work many private and State organizations have cooperated either by furnishing data or by assisting in collecting data. Acknowledgments for cooperation of the first kind are made in connection with the description of each station affected; cooperation of the second kind is acknowledged on pages 5 and 6.

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Measurements of stream flow have been made at about 5,000 points in the United States and also at many points in Alaska and the Hawaiian Islands. In July, 1920, 1,350 gaging stations were being maintained by the Survey and the cooperating organizations. Many miscellaneous discharge measurements are made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in water-supply papers from time to time.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those that represent a rate of flow, as second-feet, gallons per minute, miner's inches, and discharge in second-feet per square mile, and (2) those that represent the actual quantity of water, as run-off in depth in inches, acre-feet, and millions of cubic feet. The principal terms used in this series of reports are second-feet, second-feet per square mile, run-off in inches, and acre-feet. They may be defined as follows:

"Second-feet" is an abbreviation for "cubic feet per second." A second-foot is the rate of discharge of water flowing in a channel of rectangular cross section 1 foot wide and 1 foot deep at an average velocity of 1 foot per second. It is generally used as a fundamental unit from which others are computed.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off in inches" is the depth to which an area would be covered if all the water flowing from it in a given period were uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

An "acre-foot," equivalent to 43,560 cubic feet, is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation.

The following terms not in common use are here defined:

"Stage-discharge relation," an abbreviation for the term "relation of gage height to discharge."

"Control," a term used to designate the section or sections of the stream channel below the gage which determines the stage-discharge relation at the gage. It should be noted that the control may not be the same section or sections at all stages.

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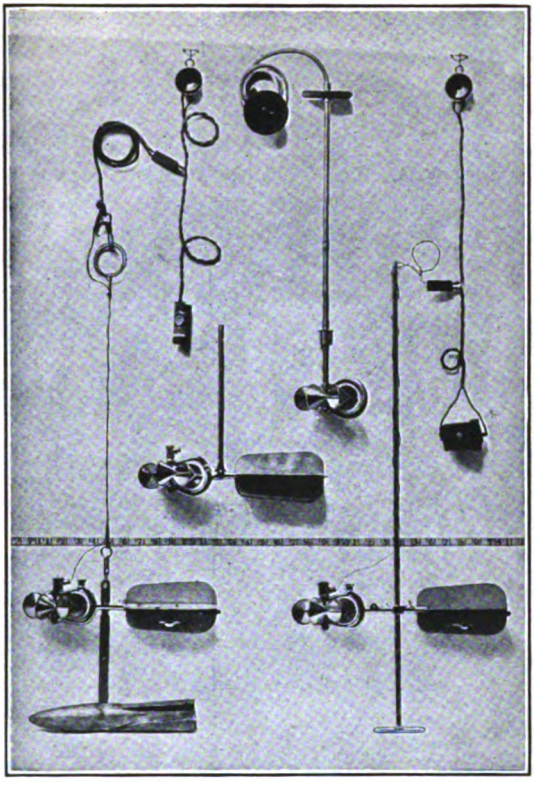
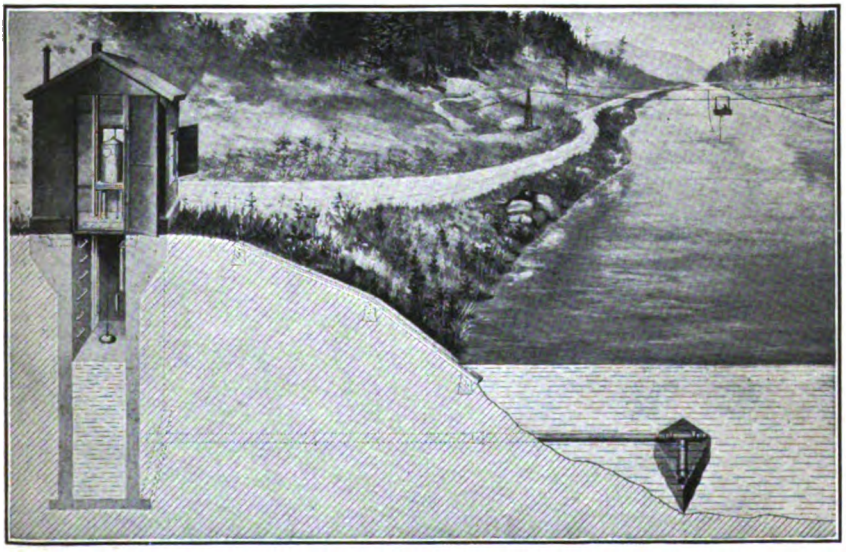


A. PRICE CURRENT METERS.



B. TYPICAL GAGING STATION.

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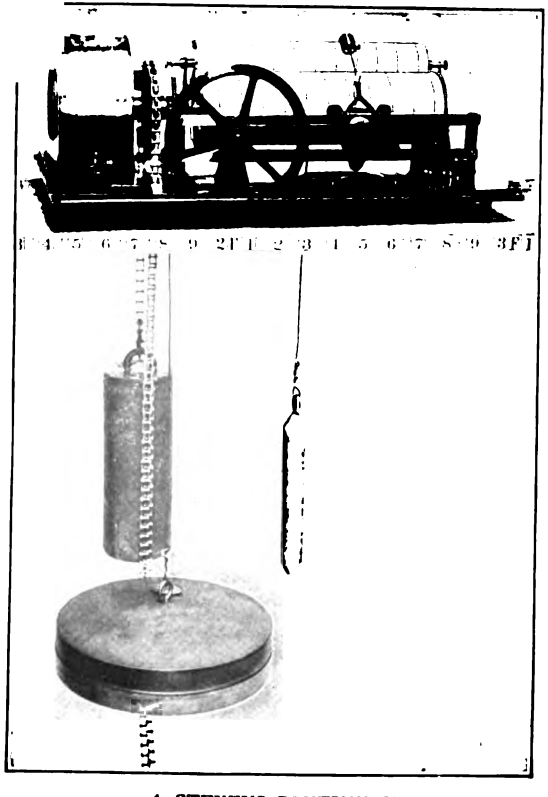
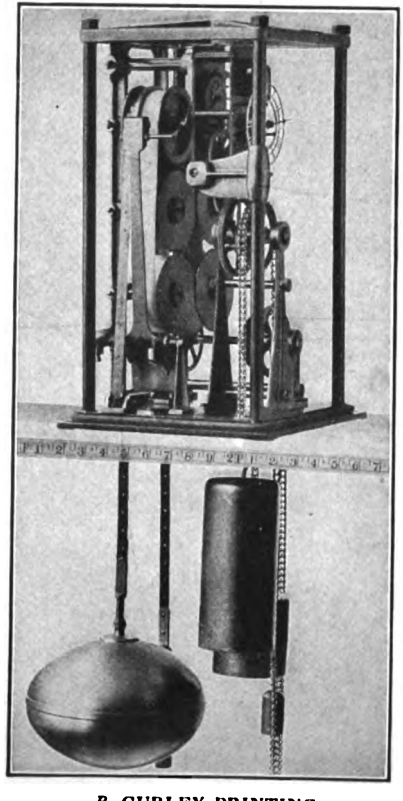
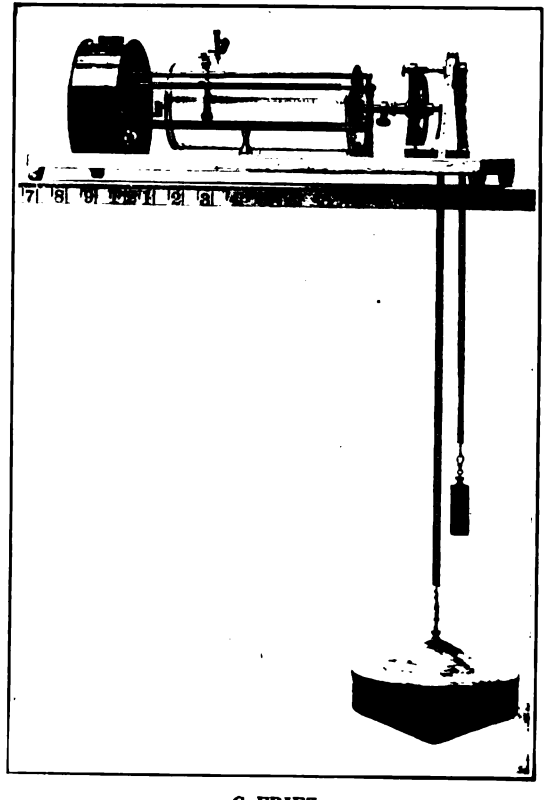


A. STEVENS CONTINUOUS.



B. GURLEY PRINTING.



C. FRIEZ.

WATER-STAGE RECORDERS.

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The "point of zero flow" for a gaging station is that point on the gage—the gage height—at which water ceases to flow over the control.

EXPLANATION OF DATA.

The data presented in this report cover the biennium beginning October 1, 1918, and ending September 30, 1920. At the first of January in most parts of the United States much of the precipitation in the preceding three months is stored as ground water, in the form of snow, or in ponds, lakes, and swamps, and this stored water passes off in the streams during the spring break-up; at the end of September, on the other hand, the only stored water available for run-off is possibly a small quantity in the ground; therefore the run-off for a year beginning October 1 is practically all derived from precipitation within that year.

The base data collected at gaging stations (Pl. I, *B*) consist of records of stage, measurements of discharge, and general information used to supplement the gage heights and discharge measurements in determining the daily flow. The records of stage are obtained either from direct readings on a staff or chain gage or from a water-stage recorder (Pl. II) that gives a continuous record of the fluctuations. Measurements of discharge are made with a current meter by the general methods outlined in standard textbooks on the measurement of river discharge.

From the discharge measurements, rating tables are prepared that give the discharge for any stage, and these rating tables, when applied to the gage heights, give the daily discharge from which the monthly and yearly means of discharge are determined.

The data presented for each gaging station in the area covered by this report comprise a description of the station, a table giving records of discharge measurements, a table showing the daily discharge of the stream and a table of monthly and yearly discharge and run-off.

If the base data are insufficient to determine the daily discharge, tables giving daily gage height and records of discharge measurements are published.

The description of the station gives, in addition to statements regarding location and equipment, information in regard to any conditions that may affect the permanence of the stage-discharge relation covering such subjects as the occurrence of ice, the use of the stream for log driving, shifting of channel, and the cause and effect of backwater; it gives also information as to diversions that decrease the flow at the gage, artificial regulation, maximum and minimum recorded stages, and the accuracy of the records.

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The table of daily discharge gives, in general, the discharge in second-feet corresponding to the mean of the gage heights read each day. At stations on streams subject to sudden or rapid diurnal fluctuation the discharge obtained from the rating table and the mean daily gage height may not be the true mean discharge for the day. If such stations are equipped with water-stage recorders the mean daily discharge is obtained by averaging the discharge at regular intervals during the day or by use of the discharge integrator, an instrument operating on the principle of the planimeter and utilizing as an essential element the rating curve of the station.

In the table of monthly discharge the column headed "Maximum" gives the mean flow for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the stage when the water surface was at crest height and the corresponding discharge was consequently larger than given in the maximum column. Likewise, in the column headed "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet per second during the month. On this average flow computations for the remaining columns, which are defined on page 2, are based.

ACCURACY OF FIELD DATA AND COMPUTED RESULTS.

The accuracy of stream-flow data depends primarily (1) on the permanence of the stage-discharge relation and (2) on the accuracy of observation of stage, measurement of flow, and interpretation of records.

A paragraph in the description of the station gives information regarding the (1) permanence of the stage-discharge relation, (2) precision with which the discharge rating curve is defined, (3) refinement of gage readings, (4) frequency of gage readings, and (5) methods of applying daily gage height to the rating table to obtain the daily discharge.

For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The monthly means for any station may represent with high accuracy the quantity of water flowing past the gage, but the figures showing discharge per square mile and depth of run-off in inches may be subject to gross errors caused by the inclusion of large non-contributing districts in the measured drainage area, by lack of information concerning water diverted for irrigation or other use,

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or by inability to interpret the effect of artificial regulation of the flow of the river above the station. "Second-feet per square mile" and "run-off in inches" are therefore not computed if such errors appear probable. The computations are also omitted for stations on streams draining areas in which the annual rainfall is less than 20 inches. All figures representing "second-feet per square mile" and "run-off in inches" published by the Survey in the early reports should be used with caution because of possible inherent sources of error not known to the Survey.

Many gaging stations on streams in the irrigated areas of the United States are situated above most of the diversions from those streams, and the discharge recorded does not show the water supply available for further development as prior appropriations below the stations must be satisfied first. To give an idea of the amount of prior appropriations, a paragraph on diversions is presented in each station description. Where figures are given they can not be considered exact but represent the best information available.

The table of monthly discharge gives only a general idea of the flow at the station and should not be used for other than preliminary estimates; the tables of daily discharge allow more detailed studies of the variation in flow. It should be borne in mind, however, that the observations in each succeeding year may be expected to throw new light on data previously published.

COOPERATION.

During the years ending September 30, 1919 and 1920, the work in Utah, Nevada, California, Oregon, Wyoming, and Idaho has been done under cooperative agreements between the United States Geological Survey and the respective States.

Cooperation with the States is effected under contracts which are made between the Director of the Federal Survey and the State engineers or other officials and are authorized by legislative acts appropriating moneys. The State contracts are essentially of the same order, the principal provisions being substantially as follows:

1. The United States Geological Survey retains direct supervision of the field work and the preparation of the data for publication.

2. The Federal Survey retains possession of field notes, maps, and other material collected, but this material is open at all times to inspection by the State officials, and if not satisfactory the agreements can be terminated at any time.

3. The salaries of gage observers and engineers and the traveling and field expenses of the engineers are divided between the two parties in some manner agreed upon, the accounts being rendered monthly in accordance with the regulations of the Federal Survey.

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4. The streams and localities in which investigations shall be made are determined by conference between the State officials and the representatives of the United States Geological Survey.

5. The cost of publication is borne entirely by the Federal Survey.

Special acknowledgments are due to G. F. McGonagle, State engineer of Utah; J. G. Scrugham, State engineer of Nevada; W. F. McClure, State engineer of California; the State Water Commission of California; Percy A. Cupper, State engineer of Oregon; F. C. Emerson, State engineer of Wyoming, and W. G. Swendsen, commissioner of reclamation of Idaho for the very efficient manner in which they have represented their States in the cooperative investigations.

Acknowledgments are also due to the officials and employees of United States Reclamation Service; United States Weather Bureau; Utah Power & Light Co.; United States Forest Service; Department of Public Service, Los Angeles, Calif.; and Southern Pacific Co., for free use of data collected by them.

Financial assistance has been rendered by the United States Indian Service, Silver Creek Valley Irrigation District, Chewacan Land & Cattle Co., Harney Basin Development Co., Eastern Oregon Livestock Co., and William Hanley Co.

DIVISION OF WORK.

Data for stations in Utah and Nevada were collected and prepared for publication under the direction of A. B. Purton, district engineer, assisted by W. E. Dickinson, L. W. Jordan, J. J. Sanford, J. W. Bones, R. R. Rowe, G. H. Russel, and E. C. Howard.

For stations in California the data were collected and prepared for publication under the direction of H. D. McGlashan, district engineer, assisted by William Kessler, Charles Leidl, T. G. Bedford, R. C. Briggs, K. M. Kelley, and J. E. Jones.

For stations in Oregon, the data were collected and prepared for publication under the direction of F. F. Henshaw, district engineer, assisted by R. C. Briggs, J. J. Dirzulaitis, and J. W. Bones.

For stations in Idaho the data were collected and prepared for publication under the direction of C. G. Paulsen, district engineer, assisted by A. G. Fiedler, T. R. Newell, L. L. Bryan, B. A. Howell, A. G. Hewel, C. W. Kief, and Miss E. H. Haugse.

For the station in Wyoming, the data were collected and prepared for publication under the direction of Robert Follansbee, district engineer, assisted by J. B. Spiegel and P. V. Hodges.

The records were reviewed and the manuscript assembled by B. J. Peterson and E. E. R. Dornbach.

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GAGING-STATION RECORDS.

GREAT SALT LAKE BASIN.

GAGES ON GREAT SALT LAKE.

LOCATION.—At Saltair, on southeast shore of lake, 15 miles west of Salt Lake City, and at Midlake, on Lucin cut-off of Southern Pacific Railroad, 30 miles west of Ogden, Weber County, Utah.

RECORDS AVAILABLE.—September 14, 1875, to December 15, 1899; March to July, 1904; October 1, 1912, to September 30, 1920. Records have appeared in publications of United States Geological Survey, as follows: Gage heights September 14, 1875, to January 4, 1890, in Monograph I, "Lake Bonneville," by G. K. Gilbert; gage heights September, 1875, to December, 1891, in the Thirteenth Annual Report of the Director, Part III; gage heights September 14, 1875, to December 15, 1899, in Water-Supply Paper 38; gage heights March 9 to July 21, 1904, in Water-Supply Paper 133; since October 1, 1912, gage heights have been published in water-supply papers. Chart showing variation in level of Great Salt Lake and monthly and annual precipitation in Great Salt Lake basin from 1850 to 1913 compiled from chart in office of chief engineer of Oregon Short Line Railroad, Salt Lake City, Utah, published by United States Geological Survey in Water-Supply Paper 330.

GAGES.—Midlake gage read August 15, 1902, to September 30, 1920; Saltair gage July 1, 1903, to September 30, 1920. The first gage was installed at Blackrock in September, 1875, and was used until October, 1877. A gage at Farmington was used from November, 1877, to November, 1879, and one at Lake Shore from November, 1879, to September, 1881. Gages at Garfield Landing were used April, 1881, to December, 1899. In 1916 E. C. LaRue, hydraulic engineer, United States Geological Survey, installed a gage at Lake Point, and by means of comparative readings for one month determined the relation between this gage and the gages at Saltair and Midlake. The elevation of the zero of the gage at Lake Point was determined from United States Geological Survey bench marks, the elevations of which had been adjusted in 1912 by the United States Coast and Geodetic Survey from precise leveling. From the Lake point gage and the table of elevations given by G. K. Gilbert in Monograph I, Mr. LaRue determined the elevations above mean sea level of the zeros of the various gages to be as follows:

Blackrock	4,208.30
Farmington	4,206.80
Lake Shore	4,203.00
Garfield Landing (U. S. G. S.)	4,198.40
Garfield (Marcus E. Jones)	4,198.40
Midlake	4,198.01
Saltair	4,196.77

EXTREMES OF STAGE.—Maximum stage recorded during year ending September 30, 1919, 5.9 feet (Saltair datum) May 15, 4.75 feet (Midlake datum) May 1. Minimum stage, 3.9 feet (Saltair datum) and 2.75 feet (Midlake datum) September 15.

Maximum stage recorded during year ending September 30, 1920, 5.3 feet (Saltair datum) June 15, and 4.17 feet (Midlake datum) June 1 and 15. Minimum stage, 3.8 feet (Saltair datum) October 15 to December 1, and 2.58 feet (Midlake datum) October 1.

1850–1920: Maximum stage recorded, 13.3 feet (Midlake datum) July 12, 1877. Estimated maximum stage, 14.5 feet (Midlake datum) occurred in 1868 (data furnished by Marcus E. Jones, Salt Lake City). Minimum stage, minus 2.3 feet (Midlake datum) in 1902.

COOPERATION.—Readings on the Midlake gage are furnished by the Southern Pacific Co.; readings on the Saltair gage by the United States Weather Bureau.

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Gage height, in feet, of Great Salt Lake, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	October.		November.		December.		January.		February.		March.	
	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.
1918-19.												
1	5.2	3.92	5.0	4.00	5.1	4.00	5.3	4.08	5.4	4.08	5.6	4.25
15	5.0	3.96	5.1	3.92	5.2	4.00	5.3	4.08	5.4	4.17	5.7	4.42

Day.	April.		May.		June.		July.		August.		September.	
	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.
1919.												
1	5.8	4.58	5.8	4.75	5.7	4.50	5.1	4.08	4.6	3.58	4.2	3.00
15	5.8	4.67	5.9	4.67	5.7	4.33	4.9	3.83	4.4	3.25	3.9	2.75

Day.	October.		November.		December.		January.		February.		March.	
	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.
1919-20.												
1	3.9	2.58	3.8	2.67	3.8	2.75	3.9	2.75	4.0	2.92	4.3	3.17
15	3.8	2.67	3.8	2.67	3.9	2.83	4.0	2.83	4.2	3.00	4.3	3.33

Day.	April.		May.		June.		July.		August.		September.	
	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.
1920.												
1	4.5	3.50	4.8	3.83	5.1	4.17	5.0	3.92	4.6	3.42	4.2	3.08
15	4.7	3.67	5.0	4.00	5.3	4.17	5.0	3.67	4.3	3.16	4.0	2.92

BEAR RIVER BASIN.

BEAR RIVER NEAR EVANSTON, WYO.

LOCATION.—In sec. 1, T. 15 N., R. 121 W., 300 feet above highway bridge and 3½ miles northwest of Evanston, Uinta County. Nearest tributary, a small stream entering from southwest half a mile above.

DRAINAGE AREA.—645 square miles (measured on topographic map and on map issued by United States Geological Survey; scale, 1: 500,000).

RECORDS AVAILABLE.—October 26, 1913, to September 30, 1920.

GAGE.—Chain on left bank, 300 feet above bridge; read by Mrs. Alex Morrow.

DISCHARGE MEASUREMENTS.—Made from cable just below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of coarse gravel. Control at riffle a short distance below gage; slightly shifting. Banks subject to overflow at stage of about 5 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 4.57 feet at 6 p. m. May 29 (discharge, 1,430 second-feet); minimum stage, 0.49 foot at 8.15 a. m. August 26 (discharge, 0.1 second-foot).

Maximum stage recorded during year ending September 30, 1920, 6.1 feet at 7 p. m. May 25 (discharge, 2,620 second-feet); minimum stage, 1.16 feet on September 21 and 22 (discharge, 35 second-feet).

1914–1920: Maximum stage occurred in 1920; minimum discharge in 1919.

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ICE.—Stage-discharge relation seriously affected by ice; gage readings discontinued during winter.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 381 second-feet from Bear River above station and 390 second-feet below.

REGULATION.—Diurnal fluctuation during spring caused by alternate melting and freezing of mountain snow. No artificial regulation.

ACCURACY.—Stage-discharge relation slightly shifting. Rating curve used October 1, 1918, to May 31, 1919, and March 21 to September 30, 1920, well defined above 15 second-feet; curve used June 1 to November 28, 1919, well defined above 20 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except for periods when discharge was below 15 second-feet, for which they are fair.

Discharge measurements of Bear River near Evanston, Wyo., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Apr. 29	J. B. Spiegel	2.36	322	May 14	J. B. Spiegel	4.26	1,230
Sept. 5	P. V. Hodges	.98	22.1	Sept. 29	P. V. Hodges	1.32	60

Daily discharge, in second-feet, of Bear River near Evanston, Wyo., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.									
1	23	74	.....	365	365	995	56	2.0	2.8
2	24	70	.....	348	440	940	34	2.4	3.8
3	24	68	.....	314	460	890	14	5.0	8.4
4	26	67	.....	266	502	640	9.8	6.6	13
5	24	67	.....	266	548	481	8.4	5.8	21
6	46	65	.....	208	570	481	6.6	5.0	22
7	53	65	.....	170	525	502	5.4	5.0	21
8	53	65	.....	128	525	502	3.4	3.4	18
9	59	64	.....	128	502	502	3.4	4.2	17
10	62	65	.....	135	480	524	3.8	4.2	16
11	65	68	.....	167	460	524	3.4	3.4	13
12	68	72	.....	162	440	524	3.4	3.4	10
13	67	75	.....	159	440	524	3.0	2.8	9.8
14	62	77	.....	144	615	502	3.0	2.8	11
15	59	74	.....	130	710	440	2.6	2.6	11
16	62	75	.....	130	760	420	2.6	2.4	9.8
17	72	75	.....	208	760	345	2.0	1.6	9.8
18	86	75	.....	266	810	328	1.6	1.2	11
19	84	74	.....	251	915	277	1.4	1.2	13
20	70	74	.....	282	970	246	1.2	.9	13
21	72	74	.....	298	1,020	217	1.2	.7	13
22	70	70	.....	298	1,080	195	1.2	.6	11
23	67	65	.....	314	1,140	185	1.2	.4	10
24	70	.....	.....	420	1,140	149	1.2	.4	9.8
25	70	.....	.....	440	1,020	132	.9	.2	9.1
26	70	.....	.....	440	1,080	108	.9	.1	8.4
27	74	.....	365	382	1,020	74	.8	.3	9.1
28	75	.....	365	348	1,200	69	.8	.8	11
29	79	.....	348	330	1,380	66	1.0	1.2	13
30	79	.....	365	348	1,260	61	1.2	1.8	23
31	77	.....	382	.....	1,080	.....	1.6	2.6	.....

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Daily discharge, in second-feet, of Bear River near Evanston, Wyo., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.									
1	41	108	.....	67	1,320	2,170	502	60	60
2	55	110	.....	68	1,320	1,720	480	57	56
3	69	112	.....	70	1,080	1,580	400	59	54
4	81	113	.....	72	1,320	1,380	382	64	51
5	91	110	.....	74	1,450	1,380	330	68	48
6	86	106	.....	77	1,140	1,450	298	70	47
7	84	102	.....	92	1,320	1,580	266	62	48
8	84	102	.....	130	1,580	1,720	208	57	50
9	81	98	.....	298	1,450	1,720	208	57	54
10	82	95	.....	942	1,450	1,650	180	54	57
11	77	95	.....	760	1,320	1,580	152	54	47
12	72	91	.....	735	1,200	1,380	144	56	43
13	67	88	.....	785	1,140	1,450	121	57	38
14	67	84	.....	942	1,200	1,320	100	57	36
15	67	81	.....	760	1,200	1,200	92	54	36
16	79	82	.....	638	1,260	1,140	92	51	39
17	82	86	.....	440	1,200	1,020	88	50	40
18	84	89	.....	314	1,520	915	88	48	41
19	84	95	.....	314	1,720	860	84	43	43
20	81	100	.....	314	1,860	860	84	44	39
21	81	102	51	251	2,170	860	77	46	35
22	77	104	51	251	2,340	860	60	50	35
23	77	108	54	251	2,520	860	59	51	38
24	74	108	57	222	2,340	860	74	51	41
25	76	102	59	222	2,340	760	83	48	48
26	82	98	62	266	2,430	660	84	50	53
27	84	98	65	330	2,170	660	75	59	56
28	88	93	67	420	2,250	660	70	70	54
29	89	90	68	970	2,430	660	64	68	54
30	93	90	72	1,260	2,430	660	60	67	54
31	102	.....	72	.....	2,340	.....	60	64	.....

NOTE.—Stage-discharge relation affected by ice Nov. 19–23, 1919; discharge estimated from temperature and gage-height records and observer's notes.

Monthly discharge of Bear River near Evanston, Wyo., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	86	22	61.0	3,750
November 1–23	77	64	70.3	3,210
March 27–31	382	348	365	3,620
April	440	128	262	15,600
May	1,380	365	781	48,000
June	995	61	395	23,500
July	56	.8	5.84	359
August	6.6	.1	2.42	149
September	23	2.8	12.4	738
1919-20.				
October	102	41	78.6	4,830
November	113	81	98.0	5,830
March 21–31	72	51	61.6	1,340
April	1,260	67	411	24,500
May	2,520	1,080	1,700	105,000
June	2,170	660	1,190	70,800
July	502	59	163	10,000
August	70	43	56.3	3,460
September	60	35	46.5	2,770

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BEAR RIVER AT HARER, IDAHO.

LOCATION.—In SE. ¼ sec. 22, T. 14 S., R. 45 E., three-fourths mile north of Harer siding on Oregon Short Line Railroad, 7 miles by road above Dingle, and 14 miles southeast of Montpelier, Bear Lake County.

DRAINAGE AREA.—2,780 square miles (determined by Utah Power & Light Co.).

RECORDS AVAILABLE.—June 21, 1913, to September 30, 1916, and January 1, 1919, to September 30, 1920.

GAGE.—Stevens water-stage recorder on right bank; installed August 24, 1914. Gage inspected by employees of Utah Power & Light Co. Inclined staff on right bank about 1,500 feet downstream used prior to August 24, 1914; control different from that of present gage.

DISCHARGE MEASUREMENTS.—Made by wading or from cable just below the gage.

CHANNEL AND CONTROL.—Bed of clean hard material, banks are overflowed at extremely high stages. Control practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 5.90 feet at 11.50 p. m. March 29 (discharge, 1,370 second-feet); minimum stage, 2.61 feet at 6.25 a. m. September 1 (discharge, 81 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 10.51 feet June 2 (discharge, 3,860 second-feet); minimum stage, 2.90 feet from midnight to 11 a. m. October 1 (discharge, 141 second-feet).

1913-1916; 1919-20: Maximum stage recorded, that of June 2, 1920; minimum stage, that of September 1, 1919.

ICE.—Stage-discharge relation seriously affected by ice. Discharge determined from current-meter measurements and from charts of water-stage recorder.

DIVERSIONS.—No large diversion above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent, except as affected by ice. Rating curve well defined between 80 and 2,600 second-feet. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspection of recorder graph; discharge for periods of ice effect determined by applying to rating table gage height corrected for ice effect by means of current-meter measurements and study of temperature records. Records good.

COOPERATION.—Gage-height record and most of discharge measurements furnished by Utah Power & Light Co.

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Discharge measurements of Bear River at Harer, Idaho, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec-ft.*	1919.		*Feet.*	*Sec.-ft.*
Jan. 3	Karl Gilgen	[a] 3.42	174	Oct. 18	Karl Gilgen	3.12	201
9	do	[a] 3.44	163	30	do	3.24	236
20	do	[a] 3.58	182	Nov. 8	do	3.36	278
29	do	[a] 3.64	188	25	do	[a] 3.52	298
Feb. 14	do	[a] 3.64	204	Dec. 9	do	[a] 3.31	185
20	do	[a] 3.64	187	30	do	[a] 3.54	159
Mar. 11	do	[a] 3.56	207				
20	do	[a] 3.56	265	1920.			
Apr. 8	Stoner and Thorum	4.45	689	Jan. 19	do	[a] 3.74	180
16	E. G. Thorum	3.94	488	Feb. 26	do	[a] 3.84	248
21	do	4.20	590	Mar. 11	do	[a] 3.91	271
May 8	Karl Gilgen	4.56	803	22	do	[a] 4.24	443
13	Hewel and Gilgen	4.55	776	Apr. 1	do	[a] 4.12	488
24	Karl Gilgen	4.15	595	19	do	5.96	1,460
29	do	4.46	748	24	do	4.74	851
June 5	do	4.73	876	May 5	do	6.04	1,470
19	do	3.48	304	12	do	7.23	2,020
27	do	3.17	210	20	do	9.28	3,070
27	Hewel and Gilgen	3.17	208	28	do	10.24	[b] 3,900
July 7	Karl Gilgen	2.73	107	June 3	L. L. Bryan	10.45	[b] 3,770
18	do	2.68	92.6	3	Karl Gilgen	10.48	[b] 3,920
21	Kief and Paulsen	2.69	92.0	14	do	8.39	2,640
29	Karl Gilgen	2.84	125	24	do	5.96	1,410
Aug 7	do	2.82	121	25	L. L. Bryan	5.68	1,300
18	do	2.68	98.8	July 8	Karl Gilgen	4.29	622
21	Kief and Tappan	2.68	92.6	15	do	4.18	580
25	Karl Gilgen	2.66	91.2	19	do	4.06	536
Sept. 2	do	2.66	94.8	21	L. L. Bryan	3.96	481
8	do	2.72	106	22	Karl Gilgen	3.95	483
13	do	2.69	98.7	31	do	3.73	396
16	B. A. Howel	2.74	103	Aug. 9	do	3.58	332
22	Karl Gilgen	2.73	104	14	do	3.52	316
26	do	2.78	119	Sept. 2	do	3.41	265
Oct. 3	do	3.08	197	15	L. L. Bryan	3.38	273
13	do	3.06	184				

[a] Stage-discharge relation affected by ice.
[b] Left bank overflowed considerably; right bank slightly.

NOTE.—Gilgen, Stoner, and Thorum, employees of Utah Power & Light Co.; Tappan, water commissioner for Bear River.

Daily discharge, in second-feet, of Bear River at Harer, Idaho, for the years ending Sept. 30, 1919 and 1920.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919.									
1	174			1,080	845	776	149	127	81
2	174			1,080	822	891	133	131	90
3	174			1,030	799	1,010	125	136	93
4				960	776	1,010	118	131	103
5			197	914	753	868	118	131	106
6	168			845	753	730	114	131	101
7		196		776	753	661	110	136	101
8				707	753	615	103	127	101
9	163			684	753	570	101	125	97
10				638	799	527	101	122	97
11			207	615	799	490	99	129	95
12				570	799	490	97	122	95
13				570	753	453	97	120	97
14	172	204		548	707	445	97	112	93
15			236	498	684	413	97	105	97
16				486	684	386	95	101	103
17		196		486	661	359	93	99	103
18				481	615	333	95	93	103
19				490	592	306	95	93	103
20	182	187	265	527	592	303	95	95	99
21			275	570	592	292	95	95	101
22			320	592	592	278	108	95	103
23			661	615	592	275	108	92	108
24			937	684	570	263	136	92	110
25	185	197	1,120	730	570	247	140	92	112
26			1,240	799	570	232	140	90	114
27			1,170	845	661	210	133	92	125
28			1,050	914	730	193	131	93	131
29	188	.....	1,190	937	707	176	129	88	127
30	188	.....	1,190	914	730	158	127	86	136
.....	188	.....	1,090	.....	776	.....	122	83	.....

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Daily discharge, in second-feet, of Bear River at Harer, Idaho, for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	A r	M	June.	July.	Aug.	Sept.
1919–20.												
1	144	394						967	3,860	944	394	279
2	146	378						1,130	3,860	826	390	281
3	180	355			205		497	1,250	3,860	779	390	284
4	206	340	216					1,340	3,710	756	382	287
5	190	318					527	1,440	3,570	708	370	290
6	185	301		166		255	548	1,580	3,440	685	359	293
7	185	288					527	1,630	3,370	662	347	296
8	182	263					615	1,680	3,300	638	343	299
9	182	251					708	1,730	3,240	615	340	303
10	182	228					967	1,820	3,010	615	336	307
11	180	240					1,250	1,970	2,850	592	333	311
12	180	245					1,390	2,020	2,700	592	333	301
13	185	255					1,340	2,060	2,650	592	333	291
14	188	265			228		1,300	2,210	2,600	592	322	281
15	196	275					1,300	2,350	2,500	592	311	272
16	201	285		174		311	1,300	2,450	2,500	592	301	272
17	201	295	187				1,390	2,550	2,500	592	291	266
18	201	305					1,440	2,700	2,400	592	288	266
19	204	315					1,440	2,900	2,240	548	291	269
20	201	288					1,340	3,060	2,070	527	285	266
21	204	288					1,110	3,120	1,900	494	281	272
22	209						1,040	3,240	1,730	490	272	269
23	206						945	3,370	1,560	481	269	278
24	206						850	3,440	1,390	473	266	291
25	226	285					826	3,500	1,340	473	268	285
26	231			185	245	460	802	3,500	1,250	481	269	291
27	234						779	3,640	1,110	469	271	304
28	236						802	3,640	1,060	457	272	294
29	238	227	162				826	3,710	1,040	413	274	288
30	240						850	3,780	1,010	402	275	285
31	355							3,860		394	277	

NOTE.—Discharge estimated because of ice Jan. 1 to Mar. 22, 1919, and Nov. 22, 1919, to Apr. 4, 1920. Braced figures show mean discharge for periods indicated. Discharge interpolated May 6, 7, Oct. 27–29 and Nov. 13–18, 1919; Apr. 23, June 19–23, Aug. 25–Sept. 1, Sept. 3–10 and 12–14, 1920.

Monthly discharge of Bear River at Harer, Idaho, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919.				
January			176	10,800
February			196	10,900
March	1,240		470	28,900
April	1,080	481	720	42,800
May	845	570	703	43,000
June	1,010	158	465	27,700
July	149	93	113	6,950
August	136	83	108	6,640
September	136	81	104	6,190
The period				184,000
1919–20.				
October	355	144	203	12,500
November	394		285	17,000
December			189	11,600
January			175	10,800
February			228	13,100
March			346	21,300
April	1,440		940	55,900
May	3,860	967	2,500	154,000
June	3,860	1,010	2,450	146,000
July	944	394	583	35,800
August	394	266	314	19,300
September	311	266	286	17,000
The year	3,860		709	514,000

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BEAR RIVER AT ALEXANDER, IDAHO.

LOCATION.—In NW. ¼ sec. 18, T. 9 S., R. 41 E., half a mile upstream from post office at Alexander, Caribou County, 6 miles above plant of Utah Power & Light Co. near Grace, 4 miles above intake of Last Chance canal, and 30 miles below confluence of Bear Lake outlet and Bear River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 27, 1911, to September 30, 1916, and April 17, 1919, to September 30, 1920.

GAGE.—Stevens water-stage recorder on right bank installed September 15, 1914; inspected by employees of Utah Power & Light Co. March 27 to November 14, 1911, an inclined staff located on right bank 1,000 feet upstream was used; November 15, 1911, to September 14, 1914, an inclined and vertical staff at the present site. Present gage at same datum as staff gage used November 15, 1911, to September 14, 1914.

DISCHARGE MEASUREMENTS.—Made from cable about 400 feet above gage during open channel period; and from a cable at Steamboat Springs about 3 miles above Alexander during period when river is frozen over.

CHANNEL AND CONTROL.—Bed composed of gravel and sand. One channel at all stages. Control practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 6.92 feet from 5 p. m. July 20 to 1 p. m. July 21 (discharge, 1,280 second-feet); minimum stage, 5.51 feet at noon May 15 (discharge, 406 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 15.95 feet at 11 a. m. December 11, during period of ice effect; maximum discharge 1,520 second-feet at 2 p. m. May 24. Minimum discharge occurred during period of ice effect and was somewhat less than 381 second-feet, the quantity measured December 16.

1911–1916; 1919–20: Maximum stage recorded December 11,1919; maximum discharge at gage height 9.5 feet May 25–28, 1914 (discharge, 3,940 second-feet); minimum stage, 4.96 feet at 7 a. m. November 15, 1915 (discharge, 310 second-feet).

ICE.—Stage-discharge relation seriously affected by ice during winter.

DIVERSIONS.—Water is diverted above the station for irrigation and for storage for power development.

REGULATION.—Water is diverted from Bear River to North or Mud Lake during the spring and released for power development during the summer. This water is returned to Bear River about 30 miles above the station.

ACCURACY.—Stage-discharge relation changed slightly during period of ice effect, 1919–20; also affected by ice. Rating curve used April 17 to November 26, 1919, well defined between 400 and 1,250 second-feet; curve used January 28 to September 30, 1920, well defined between 480 and 1,500 second-feet. Operation of recorder satisfactory, except for breaks in record as noted in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspection of recorder graph, and estimating periods of no record. Record goods.

COOPERATION.—Gage-height record and most of discharge measurements furnished by Utah Power & Light Co.

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Discharge measurements of Bear River at Alexander, Idaho, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Mar. 14	Karl Gilgen		782	Jan. 1[b]	Karl Gilgen	[a] 1.10	906
22	do	5.96	715	7[b]	do	[a] 1.12	880
Apr. 13	E. G. Thorum		569	10[b]	do	[a] .94	1,120
17	do	5.82	625	14[b]	do	[a] .80	941
25	do	5.92	620	21	do	[a] 7.56	1,020
May 15	A. G. Hewel	5.52	394	26	do	[a] 6.42	965
22	Karl Gilgen	5.78	576	Feb. 14	do	6.14	857
31	do	6.18	828	19	do	6.19	876
June 7	Gilgen and Stoner	6.13	770	22	B. A. Howell	6.23	908
17	Karl Gilgen	6.21	803	25	Karl Gilgen	5.83	663
24	do	6.36	977	Mar. 1	do	6.26	949
28	do	6.43	972	8	do	5.92	709
28	A. G. Hewel	6.43	911	13	do	5.80	652
July 2	C. E. Tappan	6.56	1,090	20	do	5.61	518
3	do	6.73	1,120	30	do	5.67	547
8	Karl Gilgen	6.62	1,130	Apr. 5	do	5.80	627
15	do	6.75	1,190	10	do	6.41	1,030
17	C. E. Tappan	6.76	1,150	14	C. G. Paulsen	6.66	1,170
26	Karl Gilgen	6.70	1,180	20	Karl Gilgen	6.22	845
27	Kief and Tappan	6.68	1,090	May 3	do	6.10	786
Aug. 2	Karl Gilgen	6.64	1,180	7	L. L. Bryan	6.20	840
9	do	6.61	1,120	10	Karl Gilgen	6.43	1,020
20	do	6.56	1,050	17	do	6.91	1,340
20	C. W. Kief	6.50	1,020	22	do	7.02	1,440
27	Karl Gilgen	6.60	1,080	29	do	7.08	1,510
Sept. 3	do	6.57	1,070	June 4	L. L. Bryan	6.54	1,080
9	do	6.33	900	5	Karl Gilgen	6.45	1,010
10	B. A. Howell	6.28	850	15	do	6.78	1,220
10	do	6.28	857	19	do	6.54	1,060
15	Karl Gilgen	6.38	921	20	L. L. Bryan	6.82	1,280
19	B. A. Howell	6.43	931	26	do	7.10	1,470
23	Karl Gilgen	6.42	983	26	Karl Gilgen	7.10	1,440
27	do	6.43	958	July 6	do	6.64	1,110
Oct. 6	do	5.98	698	13	do	6.74	1,200
9	B. A. Howell	5.91	642	15	L. L. Bryan	6.69	1,170
14	Karl Gilgen	6.16	819	17	Karl Gilgen	6.82	1,280
23	do	6.06	732	23	do	6.74	1,190
28	do	5.86	632	30	L. L. Bryan	6.66	1,180
Nov. 5	do	5.87	610	Aug. 3	Karl Gilgen	6.74	1,240
21	do	5.79	550	10	do	6.67	1,170
28	do	[a] 6.26	742	Sept. 4	do	6.19	880
Dec. 6	do	[a] 6.39	983	15	L. L. Bryan	6.37	990
14[b]	do	[a] 1.63	633				
16[b]	do	[a] 1.32	381				
23[b]	do	[a] .92	1,110				
27[b]	do	[a] .92	1,120				

[a] Stage-discharge relation affected by ice.
[b] Measurement made at Steamboat Springs, 3 miles upstream from station; not referred to regular gage.

NOTE.—Gilgen, Thorum, and Stoner, employees of Utah Power & Light Co.; Tappan, water commissioner for Bear River.

Daily discharge, in second-feet, of Bear River at Alexander, Idaho, for the years ending Sept. 30, 1919 and 1920.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1919.							1919.						
1	.....	654	792	1,000	1,100	1,070	16	.....	438	810	1,210	1,040	1,000
2	.....	618	804	1,070	1,100	1,100	17	588	720	810	1,210	1,040	972
3	.....	576	804	1,140	1,100	1,070	18	588	780	762	1,210	1,040	972
4	.....	606	804	1,180	1,070	1,040	19	618	600	810	1,180	1,070	972
5	.....	612	796	1,160	1,040	1,040	20	524	516	875	1,280	1,000	972
6	.....	570	792	1,140	1,000	972	21	630	499	875	1,280	972	940
7	.....	546	780	1,120	1,000	972	22	630	558	842	1,240	940	940
8	.....	494	762	1,100	1,040	940	23	630	600	908	1,210	940	972
9	.....	482	756	1,100	1,070	908	24	630	612	940	1,180	1,000	972
10	.....	494	780	1,100	1,000	875	25	642	564	972	1,140	1,020	972
11	.....	460	842	1,100	1,070	842	26	648	522	972	1,140	1,050	972
12	.....	444	842	1,100	1,070	842	27	648	499	972	1,140	1,070	972
13	.....	438	810	1,140	1,040	842	28	648	488	972	1,140	1,070	940
14	.....	422	810	1,180	1,040	810	29	648	528	972	1,140	1,100	940
15	.....	411	810	1,180	1,040	940	30	648	714	972	1,140	1,140	875
							31	.....	792	.....	1,100	1,070	.....

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Daily discharge, in second-feet, of Bear River at Alexander, Idaho, for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	875				830	904	630	730		1,380	1,220	904
2	842				811	873	632		1,280	1,320	1,220	873
3	786	603			805	761	635	817		1,280	1,230	873
4	714				830	700	637	817	1,130	1,230	1,160	873
5	672	600		885	830	605	640	823	1,030	1,200	1,130	904
6	666	618			836	542	670	848	968	1,160	1,130	936
7	624	582	900		842	536	768	873	936	1,130	1,130	936
8	618	558			792	774	904	904	1,100	1,130	1,100	904
9	624	522			743	968	968	936	1,270	1,160	1,130	904
10	630				737	904	1,000	1,000	1,300	1,270	1,130	904
11	648				700	823	904	1,060	1,230	1,370	1,060	861
12	666			1,020	799	700	936	1,160	1,130	1,300	1,060	861
13	714				904	670	968	1,200	1,130	1,230	1,060	904
14	780				805	700	1,160	1,200	1,230	1,200	1,060	936
15	804	545			817	676	1,130	1,230	1,270	1,160	1,060	968
16	780				780	706		1,300	1,270	1,230	1,060	968
17	750		550		786	676	1,000	1,340	1,250	1,270	1,100	936
18	696				792	670		1,370	1,220	1,200	1,130	936
19	714				811	640		1,400	1,200	1,230	1,130	936
20	774				842	548	867	1,400	1,270	1,230	1,160	904
21	786	570		990	836	564	786	1,400		1,270	1,160	904
22	738	582			823	640	712	1,400		1,270	1,130	904
23	720	630			805	634	676	1,400	1,330	1,230	1,100	904
24	702	654			682	570	652	1,480		1,200	1,100	1,000
25	666	648			652	548		1,440		1,160	1,100	1,000
26	618	582	1,040		718	576		1,300	1,400	1,200	1,100	904
27	606				780	570		1,200	1,300	1,200	1,130	823
28		730		1,030	861	564	730	1,300	1,230	1,200	1,160	774
29	603			936	854	578		1,440	1,300	1,200	1,100	737
30				904	.....	593		1,280	1,440	1,210	1,100	725
31		.....		860	.....	628	.....		.....	1,210	1,100	.....

NOTE.—Discharge, Nov. 27, 1919, to Jan. 27, 1920, estimated because of ice effect, by means of graphic method for determining effective gage heights. Discharge estimated because of no record for following periods: Oct. 28 to Nov. 4, Nov. 10–20, 1919; Apr. 16–19, Apr. 25 to May 2, May 30 to June 3, and June 21–25, 1920. Discharge interpolated July 5–7, Aug. 25, 26, and Sept. 24–26, 1919; Mar. 29, Apr. 1–4, June 17, 18, July 1–3, and July 30 to Aug. 2, 1920. Braced figures indicate mean discharge for periods indicated.

Monthly discharge of Bear River at Alexander, Idaho, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919.				
April 17–30	648	524	623	17,300
May	792	411	557	34,200
June	972	756	848	50,500
July	1,280	1,000	1,150	70,700
August	1,140	940	1,040	64,000
September	1,100	810	955	56,900
The period	.....	.....	.....	294,000
1919–20.				
October	875	.....	698	42,900
November	.....	.....	596	35,500
December	.....	.....	871	53,600
January	.....	.....	962	59,200
February	861	652	797	45,800
March	968	536	672	41,300
April	1,160	630	822	48,900
May	1,480	.....	1,160	71,300
June	.....	936	1,240	73,800
July	1,380	1,130	1,230	75,600
August	1,230	1,060	1,120	68,900
September	1,000	725	897	53,400
The year	1,480	.....	923	670,000

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BEAR RIVER NEAR WESTON, IDAHO.

LOCATION.—In SE. ¼ sec. 17, T. 16 S., R. 39 E., at Weston-Fairview highway bridge, 2 or 3 miles north of Idaho-Utah State boundary and 3 miles east of Weston, Franklin County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 21, 1919, to September 30, 1920. Records at this station are comparable with those obtained at the old gaging station near Preston, Idaho, where records are available from October 11, 1889, to January 15, 1917.

GAGE.—Stevens continuous water-stage recorder on left bank; inspected by Mrs. M. Rasmussen.

DISCHARGE MEASUREMENTS.—Made from highway bridge immediately below gage.

CHANNEL AND CONTROL.—Bed composed of gravel and earth. Banks fairly high and covered with brush for the most part; one channel at all stages. Low-water control is a fairly well defined gravel riffle about 200 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, from water-stage recorder, 7.50 feet at 7 p. m. May 26 (discharge, about 3,540 second-feet); minimum stage, 1.28 feet at 5 p. m. November 15 (discharge, about 174 second-feet).

ICE.—Stage-discharge relation seriously affected at times by ice.

DIVERSIONS.—Numerous ditches divert for irrigation above the station. Last Chance canal, which diverts about 4 miles below the Alexander station, carried 270 second-feet May 25, 1911 (measured by engineer of Telluride Power Co.). West Cache canal, which heads several miles above the station, carried 26 second-feet July 24, 1911, and 5 second-feet August 5, 1911. Water diverted by Utah Power & Light Co. about 6 miles below the Alexander station is used for power development and returned to the river above this gaging station.

REGULATION.—Considerable diurnal fluctuation is caused by operation of power plants above the station and by release of water from Oneida reservoir about 25 miles above, which receives water from Mud or North Lake about 160 miles above the station.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve fairly well defined. Operation of water-stage recorder satisfactory, except during part of December and January during ice period and as noted in footnote to table of daily discharge. Daily discharge during open-channel period ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph or by averaging the mean gage height obtained for equal portions of a day. Records good, except during winter and for other periods when estimates are made because of lack of gage heights, for which they are poor.

COOPERATION.—Gage-height record and numerous discharge measurements furnished by Utah Power & Light Co.

Discharge measurements of Bear River near Weston, Idaho, during the period Sept. 27, 1919, to Sept. 30, 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Sept. 27	R. P. Flagel [a]	2.48	609	Mar. 4	C. G. Paulsen	(c)	1,250
Oct. 2	B. A. Howell	2.72	722	Apr. 14	R. P. Flagel	4.73	1,750
2	do	2.76	828	May 14	C. G. Paulsen	5.76	2,280
23	R. P. Flagel	2.36	540	26	R. P. Flagel	6.48	2,830
Dec. 2	do	2.48	618	June 5	L. L. Bryan	3.62	1,060
				5	do	3.06	801
1920				17	R. P. Flagel	4.02	1,350
Jan. 18	B. A. Howell	[b] 5.29	986	July 20	do	2.98	869
20	R. P. Flagel	[b] 5.05	810	Aug. 2	do	2.18	516
Feb. 1	B. A. Howell	2.74	682	3	L. L. Bryan	2.22	561
20	do	2.04	432	25	R. P. Flagel	2.43	577
23	R. P. Flagel	3.39	1,070	Sept. 17	L. L. Bryan	1.98	401

[a] Employee of Utah Power & Light Co.
[b] Stage discharge relation affected by ice.
[c] Stage increased 0.94 foot during measurement.

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Daily discharge, in second-feet, of Bear River near Weston, Idaho, for the year ending Sept. 30, 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	495	500		1,020		1,050	1,660	2,270	1,060	589	1,150
2	.....	451	581		1,150	1,100	999	1,660	2,040	856	532	1,320
3	.....	927	1,320		1,150		999	1,710	1,760	999	597	975
4	.....	951	832		1,120	1,050	856	1,550	1,870	1,070	548	
5	.....	1,020	1,100		999	1,270	548	1,660	1,660	1,050	652	
6	.....	832	1,300		1,120	1,550	763	1,710	1,660	740	763	960
7	.....	975	1,220		1,100	1,710	718	1,820	1,870	1,150	631	
8	.....	1,200	1,400	1,150	903	1,320	550	1,610	1,980	1,220	585	
9	.....	1,400			1,150	880	1,120	1,660	1,450	1,400	696	951
10	.....	1,350			1,270	631	1,350	1,980	1,270	927	880	1,220
11	.....	786			1,270	519		2,090	1,270	718	832	1,450
12	.....	1,070	1,100		1,220	589		1,980	1,660	696	999	1,250
13	.....	652			1,050			2,210	1,760	1,050	832	1,150
14	.....	718						2,440	1,350	1,300	880	975
15	.....	507				770	1,550	2,380	1,300	1,250	832	951
16	.....	696			980			2,380	1,350	1,200	903	880
17	.....	927						2,780	1,400	951	1,270	927
18	.....	556	800			951		2,850	1,350	903	696	652
19	.....	809				999		2,850	1,450	1,070	786	696
20	.....	927			903	951	1,760	2,510	1,350	1,300	763	809
21	652	1,200		1,200	1,020	975	1,610		718	718	786	1,020
22	718	1,170			1,170		1,120		880	927	581	1,120
23	674	951			1,020	1,100			999	856	786	1,050
24	856	999			1,120			2,550	1,200	809	1,100	740
25	1,070	1,120			1,610	1,350			1,120	610	1,220	499
26	832	1,220	1,200		1,380	1,250	1,100		880	631	975	396
27	880			1,550	1,150	1,170		2,580	1,170	809	786	543
28	1,270	750		1,500	674	999		2,270	1,550	832	443	1,200
29	999			1,350	809	903		1,980	1,610	696	475	1,220
30	951			1,320	.....	1,050	1,070	2,320	1,450	903	903	880
31	696	.....		1,120	.....	856	.....	2,510	.....	718	880	.....

NOTE.—Discharge estimated because of ice, Nov. 27 to Dec. 1 and Dec. 9, 1919, to Jan. 26, 1920; estimated on account of poor or missing gage record, Feb. 14–19, Mar. 1–3, 13–17, 22–24, Apr. 8, 11–19, 23–29, May 21–26, Sept. 4–8; interpolated Feb. 26. Braced figures indicate mean discharge for periods indicated.

Monthly discharge of Bear River near Weston, Idaho, for the year ending Sept. 30, 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 21–31	1,270	652	873	19,000
November	1,400	451	897	53,400
December	.....	.....	1,070	65,800
January	.....	.....	1,200	73,800
February	1,610	674	1,080	62,100
March	1,710	519	1,010	62,100
April	.....	548	1,210	72,000
May	.....	1,550	2,210	136,000
June	2,270	718	1,450	86,300
July	1,400	610	949	58,400
August	1,270	443	781	48,000
September	1,450	396	961	57,200
The period	.....	.....	.....	794,000

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BEAR RIVER NEAR COLLINSTON, UTAH.

LOCATION.—In W. ½ sec. 34, T. 13 N., R. 2 W., a quarter of a mile below power plant of Utah Power & Light Co., at railroad siding called Wheelon, 4 miles north of Collinston, Box Elder County. Little Malad River enters 20 miles below station.

DRAINAGE AREA.—6,000 square miles (measured on topographic and U. S. Forest Service maps).

RECORDS AVAILABLE.—July 1, 1889, to September 30, 1920.

GAGE.—Friez 8-day water-stage recorder on left bank installed November 17, 1919. Gurley 8-day water-stage recorder at same site February 26, 1914, to November 17, 1919. Recorders inspected by H. G. Stone during 1919, and G. F. Taylor during 1920. Also inside hook and outside inclined staff gages.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and sand. Left bank high and covered with willows; not subject to overflow. Right bank fairly high and covered with willows; may be overflowed by exceptionally high floods. Control not well defined.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 3.90 feet at 4 p. m. April 1 (discharge, 3,840 second-feet); minimum stage, 0.54 foot on outside gage, July 2–4 (discharge, 62 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 5.54 feet at 4 p. m. May 25 (discharge, 6,510 second-feet); minimum stage, 0.42 foot at midnight August 5 (discharge practically zero).

1889–1920: Maximum stage recorded, 7.7 feet June 7–10, 1909 (discharge, 11,600 second-feet); minimum stage occurred in 1920.

ICE.—Stage-discharge relation seldom affected by ice.

DIVERSIONS.—West Side and Hammond canals divert water on both sides of Bear River about 2 miles above station; water can be used from either or both of these canals to supply the Wheelon power plant; water passing the Wheelon penstocks is used for irrigation or can be returned to the river. There are several large power plants farther upstream and considerable water is also diverted for irrigation.

REGULATION.—Flow at station is affected to some extent by operation of power plants and storage and release of water from Bear Lake reservoir.

ACCURACY.—Stage-discharge relation permanent; affected by ice December 12–19, 21, 25, and 28–30, 1919, and January 2–3, and 8–15, 1920. During 1919, outside gage rated independently below 2.10 feet. Rating curves well defined throughout. Operation of water-stage recorder satisfactory except for October 12–14, and December 10, 1918, January 4, 9, 10, 12–14, October 27, 30, and November 8, 1919, and August 8, 9, 1920, when clock was not running; and June 7 to September 9, 1919, when stage was too low for operation of recorder. June 7 to September 1, 1919, outside gage was read once a day to hundredths. September 2–9, 1919, inside hook gage was read once a day to hundredths. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Discharge interpolated for days when recorder clock was stopped. For period June 7 to September 9, 1919, discharge determined by applying daily gage height to rating table. Records excellent.

COOPERATION.—Gage-height record and 22 discharge measurements furnished by Utah Power & Light Co.

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Discharge measurements of Bear River near Collinston, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.		Discharge.
		Inside gage.	Outside gage.	
		Feet.	*Feet.*	*Sec.-ft.*
1918.				
Oct. 7	L. C. Monson [a]	2.48		1,670
Dec. 17	do	2.69		2,180
1919.				
Jan. 29	A. B. Purton	2.62		1,790
Mar. 4	L. C. Monson	2.90	2.81	2,540
Apr. 4	do	3.65	3.55	3,270
22	Monson and Stoner	3.07	3.00	2,520
June 4	L. C. Monson	2.00	1.86	1,040
July 10	do		.62	90
28	H. L. Stoner [a]		.77	152
Sept. 9	L. C. Monson	1.87	1.78	928
29	R. P. Flagel [a]	1.65	1.54	750
Oct. 25	do	2.20		1,300
Nov. 18	do	2.20		1,300
Dec. 15	do	[b] 1.95		885
1920.				
Jan. 19	do	2.50		1,750
Feb. 18	do	2.28		1,480
Apr. 19	do	3.58		3,310
May 13	do	4.70		5,110
25	do	5.50		6,430
June 18	do	2.80		2,030
July 19	do	.75		96
29	do	.90		187
Aug. 26	do	1.49		563
Sept. 1	A. B. Purton	1.91		965

[a] Engineer for Utah Power & Light Co. [b] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Bear River near Collinston, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	1,120	1,240	2,090	2,020	1,480	1,480	3,460	2,900	1,520	65	92	240
2	1,360	1,240	1,880	1,550	1,620	1,520	3,700	2,880	1,450	62	357	436
3	1,240	1,420	1,950	1,240	1,680	1,680	3,760	2,710	1,280	62	267	527
4	1,300	1,740	1,950	1,180	1,880	2,180	3,420	2,600	1,200	62	219	812
5	1,300	1,740	1,950	1,120	1,810	1,950	3,220	2,350	1,120	65	170	860
6	1,680	1,810	2,090	1,620	1,810	1,680	3,150	2,240	910	65	420	900
7	1,810	1,620	1,810	1,950	1,950	1,630	2,880	2,060	930	65	540	910
8	1,810	1,680	1,810	1,950	1,810	1,600	2,500	1,910	770	68	375	910
9	1,810	1,420	1,880	1,840	1,680	1,560	2,160	1,720	770	130	240	910
10	1,680	1,360	1,810	1,730	1,550	1,370	2,210	1,600	330	84	240	880
11	1,550	1,120	1,740	1,620	1,880	1,710	2,090	1,590	750	88	205	880
12	1,550	1,070	1,810	1,640	2,160	1,730	2,450	1,420	420	92	80	841
13	1,550	1,480	1,680	1,650	2,090	1,620	2,270	1,580	348	120	88	860
14	1,550	1,620	1,740	1,660	1,950	1,890	1,980	1,520	330	145	285	880
15	1,420	1,740	1,950	1,680	1,740	2,000	1,860	1,160	170	125	240	880
16	1,680	1,740	1,880	1,680	1,680	1,980	1,850	1,400	170	100	160	711
17	1,680	1,810	1,880	1,620	1,550	1,710	1,890	1,580	160	120	145	590
18	1,740	1,680	1,740	1,620	1,620	2,360	1,910	1,360	77	116	145	590
19	1,550	1,810	1,880	1,620	1,550	2,630	2,020	1,000	375	100	80	720
20	1,180	1,810	1,880	1,480	1,620	2,780	2,120	841	100	240	267	527
21	1,050	1,740	1,740	1,550	1,680	3,020	2,330	1,090	88	184	135	527
22	1,180	1,810	1,420	1,620	1,680	3,080	2,500	1,100	74	100	170	422
23	1,420	1,880	1,420	1,550	1,670	3,070	2,610	1,050	74	240	450	235
24	1,680	2,300	1,550	1,620	1,590	3,190	2,680	1,070	77	267	474	590
25	1,620	1,680	1,620	1,740	1,650	3,300	2,880	1,160	88	120	254	590
26	1,880	1,420	1,420	1,740	1,650	3,050	3,020	1,290	84	84	88	574
27	1,620	1,810	1,120	1,880	1,720	2,930	2,850	1,180	88	177	170	422
28	1,360	2,020	1,680	2,090	1,840	2,930	2,780	1,090	80	177	160	466
29	1,480	1,880	1,950	1,950	.....	2,960	2,830	1,340	65	150	100	574
30	1,420	1,740	2,090	1,810	.....	2,910	2,880	2,160	65	140	92	784
31	1,360	.....	1,950	1,620	.....	2,980	.....	1,950	.....	226	294	.....

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Daily discharge, in second-feet, of Bear River near Collinston, Utah, for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	841	1,300	1,180	1,850	1,870	1,160	1,550	2,620	4,740	1,320	92	1,030
2	1,110	1,200	1,000	1,800	1,780	1,320	1,690	3,240	4,500	940	35	1,180
3	1,320	1,110	1,030	1,700	2,010	2,270	1,620	3,380	4,020	720	30	1,350
4	1,420	1,510	1,680	1,590	1,960	2,150	1,630	3,450	3,540	930	40	1,400
5	1,590	1,590	1,420	1,450	1,850	1,910	1,460	3,370	3,420	585	30	1,450
6	1,420	1,580	1,600	1,460	1,680	1,960	1,420	3,460	3,110	201	206	1,000
7	1,090	1,470	1,780	1,780	1,780	2,160	1,560	3,720	3,050	461	293	832
8	1,180	1,660	1,740	1,600	1,710	2,120	1,480	3,910	3,130	765	291	982
9	1,400	1,850	1,140	1,500	1,580	1,890	1,740	3,990	3,030	960	289	1,040
10	1,300	1,950	1,550	1,550	1,670	1,400	2,460	4,360	2,640	910	287	1,090
11	1,920	1,950	2,090	1,350	1,780	1,460	2,840	4,870	2,500	365	453	1,160
12	1,580	1,420	1,750	1,500	1,780	1,150	2,950	5,150	2,390	174	484	1,350
13	1,090	1,630	1,100	1,500	1,580	1,190	2,660	5,080	2,760	201	526	1,040
14	962	1,320	900	1,700	1,470	1,250	2,630	5,110	2,640	542	287	990
15	1,020	1,120	900	1,700	1,260	1,520	3,240	5,340	2,260	675	379	850
16	960	1,080	950	1,710	1,320	1,650	4,120	5,500	2,030	693	287	720
17	900	1,050	1,400	1,680	1,400	1,600	4,460	5,500	2,030	445	422	765
18	1,180	1,320	1,700	1,620	1,540	1,560	4,120	5,610	2,140	319	484	765
19	1,450	1,040	1,400	1,690	1,520	1,680	3,370	5,810	1,990	174	92	484
20	1,480	1,200	1,050	1,880	1,650	1,720	2,980	5,930	2,020	386	206	422
21	1,120	1,370	1,500	1,870	1,580	1,650	3,060	5,910	1,550	386	217	585
22	1,110	1,640	1,810	1,750	1,590	1,590	2,860	5,960	1,140	415	206	920
23	1,100	1,580	1,880	1,720	1,740	1,680	2,660	6,070	1,180	228	92	1,180
24	1,090	1,420	1,960	1,680	1,680	1,880	2,970	6,150	1,280	438	217	1,240
25	1,240	1,460	1,800	1,720	1,890	2,140	2,750	6,410	1,370	453	461	1,240
26	1,360	1,550	1,760	1,910	1,990	2,300	2,500	6,370	1,070	150	585	1,050
27	1,390	1,360	2,020	2,280	1,780	2,080	2,420	6,070	1,020	30	729	860
28	1,420	1,740	1,800	2,280	1,620	1,990	2,200	5,660	1,200	102	910	1,020
29	1,550	2,020	1,720	2,140	1,300	1,650	1,920	5,200	1,510	169	639	1,620
30	1,520	1,480	1,690	2,090	.....	1,720	1,990	4,630	1,550	149	711	1,680
31	1,480	.....	1,730	2,030	.....	1,670	.....	4,650	.....	185	1,000	.....

Monthly discharge of Bear River near Collinston, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	1,880	1,050	1,500	92,200
November	2,390	1,070	1,650	98,200
December	2,090	1,120	1,790	110,000
January	2,090	1,120	1,670	103,000
February	2,160	1,480	1,730	96,100
March	3,300	1,370	2,270	140,000
April	3,760	1,850	2,610	155,000
May	2,900	841	1,640	101,000
June	1,520	65	465	27,700
July	267	62	124	7,620
August	540	80	226	13,900
September	910	235	668	39,700
The year	3,760	62	1,360	984,000
1919-20.				
October	1,920	841	1,280	78,700
November	2,020	1,040	1,470	87,500
December	2,090	900	1,520	93,500
January	2,280	1,350	1,740	107,000
February	2,010	1,260	1,670	96,100
March	2,300	1,150	1,720	106,000
April	4,460	1,420	2,510	149,000
May	6,410	2,620	4,920	303,000
June	4,740	1,020	2,360	140,000
July	1,320	30	467	[illegible]
August	1,000	30	354	
September	1,680	422	1,040	
The year	6,410	30	1,750	

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SODA CREEK NEAR SODA SPRINGS, IDAHO.

LOCATION.—In sec. 24, T. 8 S., R. 41 E., at George Schmidt's ranch, one-eighth mile below confluence of two branches of creek and 5 miles north of Soda Springs, Caribou County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 5, 1913, to September 30, 1920.

GAGE.—Vertical staff on left bank, about one-fourth mile south of ranch house, installed August 1, 1913; read by George Schmidt. Gage used March 5 to July 31, 1913, was vertical staff 30 feet upstream on left bank with same control. Datum of old gage between 0.1 and 0.2 foot above that of present gage.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed composed of lava rock. Control is a reef about 15 feet below gage. Stage-discharge relation affected by aquatic growth.

ICE.—Stage-discharge relation not affected by ice.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 5.00 feet April 1 and 2 (discharge, 231 second-feet); minimum stage, 3.95 feet January 8 and 12–15 (discharge, 38 second-feet).

Maximum stage recorded during year ending September 30, 1920, 4.90 feet at 6.30 p. m. April 13 (discharge, 200 second-feet); minimum stage, 4.08 feet several days in January, February, and March (discharge, 46 second-feet).

1913–1920: Maximum stage recorded, 5.3 feet April 6, 1913 (discharge, 324 second-feet); minimum stage occurred in 1919.

DIVERSIONS.—Practically no water diverted above station; a small ditch takes water just below gage.

ACCURACY.—Stage-discharge relation not permanent on account of effect of aquatic growth, but flow is fairly uniform. Several rating curves used. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying gage height to rating table or by the indirect method for shifting control. Records good.

Discharge measurements of Soda Creek near Soda Springs, Idaho, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Dec. 6	T. R. Newell	4.07	50.4	Feb. 22	B. A. Howell	4.08	45.3
				Apr. 13	C. O. Paulsen	4.55	123
1919.				May 8	L. L. Bryan	4.34	87.6
Mar. 20	do	4.00	44.1	June 21	do	4.18	60.7
May 17	A. G. Hewel	4.24	67.4	July 15	do	4.21	63.8
June 25	do	4.13	54.8	30	do	4.23	68.9
July 27	C. W. Kief	4.14	54.8	Sept. 13	do	4.20	62.4
Aug. 20	do	4.13	51.6				
Sept. 11	B. A. Howell	4.11	45.6				
11	do	4.11	49.2				
Oct. 10	Howell and Tappan [a]	4.15	54.1				

[a] Water commissioner.

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Daily discharge, in second-feet, of Soda Creek near Soda Springs, Idaho, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	51	59	57	48	41	43	195	83	67	54	54	51
2	51	59	57	51	41	43	231	83	67	54	54	51
3	54	59	57	47	41	41	227	83	67	54	54	51
4	54	59	54	43	41	41	219	83	67	54	51	51
5	54	60	54	43	41	41	172	83	67	54	51	51
6	57	60	53	43	41	41	140	83	67	54	51	51
7	57	60	54	41	41	41	123	83	67	54	51	51
8	58	60	54	38	41	41	100	79	67	54	51	51
9	58	60	54	41	41	41	86	75	63	54	51	51
10	58	60	54	41	41	41	79	75	63	57	51	51
11	55	60	54	41	43	41	79	75	63	55	51	51
12	55	60	54	38	43	41	75	75	63	58	51	51
13	55	62	54	38	43	43	79	75	62	58	51	51
14	55	62	54	38	43	43	75	75	65	58	51	51
15	57	62	54	38	43	43	79	70	62	58	51	51
16	59	62	54	41	43	43	79	70	62	58	51	51
17	59	62	54	41	43	43	83	72	62	58	51	51
18	59	62	54	41	43	43	83	70	58	58	51	51
19	59	62	54	41	43	43	79	70	58	58	51	51
20	59	62	54	41	43	43	83	70	58	58	52	51
21	59	63	54	41	43	43	83	70	58	58	51	51
22	60	63	54	41	43	43	83	70	58	58	51	51
23	60	63	54	41	43	43	83	70	58	58	51	51
24	60	63	54	41	41	43	83	70	54	58	51	51
25	60	63	54	41	41	54	83	70	55	54	51	51
26	60	63	54	41	43	54	83	70	54	54	51	51
27	58	63	54	41	41	57	83	67	54	54	51	51
28	58	60	54	41	41	57	83	67	54	54	51	51
29	59	60	54	41	.....	54	79	67	54	54	51	54
30	59	57	51	41	.....	83	83	70	54	54	51	58
31	59	.....	48	41	.....	123	.....	67	.....	54	51	.....
1919–20.												
1	60	60	58	51	51	46	51	113	70	86	70	75
2	60	60	58	51	51	46	51	102	70	86	70	70
3	58	75	58	51	51	46	48	94	70	86	66	70
4	58	83	58	51	51	46	48	94	66	81	66	70
5	54	75	58	51	51	46	48	94	66	78	66	70
6	54	72	58	51	48	46	48	89	66	78	66	70
7	54	72	58	51	48	46	48	89	66	75	66	75
8	54	72	58	51	48	46	48	89	66	75	66	75
9	54	67	58	51	48	46	51	84	66	70	66	70
10	54	63	58	51	48	46	72	84	66	70	66	70
11	54	60	58	48	48	48	76	81	70	66	66	70
12	54	60	58	48	48	48	93	81	70	66	66	70
13	54	60	58	48	48	48	148	81	113	66	66	66
14	54	60	54	48	48	48	179	81	123	66	66	70
15	54	60	54	46	48	48	148	81	78	65	66	70
16	54	60	51	46	46	46	102	81	66	70	66	70
17	54	60	51	46	46	46	98	81	60	70	66	70
18	54	60	51	46	46	46	89	81	60	70	66	70
19	54	58	51	48	46	46	84	81	60	75	66	70
20	54	58	51	48	46	46	81	78	60	75	66	70
21	54	58	51	48	46	48	73	78	60	75	66	66
22	54	58	51	48	46	48	69	78	60	75	66	66
23	54	58	51	48	46	51	66	78	60	70	66	66
24	54	58	51	48	46	51	66	81	60	70	66	70
25	54	58	51	48	46	54	66	81	60	70	66	70
26	54	58	51	51	46	51	81	84	78	70	66	66
27	58	58	51	51	46	51	127	84	78	70	70	66
28	58	58	51	51	46	51	138	87	81	70	75	66
29	60	58	51	51	46	54	121	87	81	70	75	66
30	60	58	51	51	.....	58	117	81	86	67	75	66
31	60	.....	51	51	.....	51	.....	78	.....	70	75	.....

NOTE.—Shifting-control method applied Oct. 1 to Nov. 27, 1918; June 9–12, July 10–11, 1919; Apr. 11, 12, 14, May 28 and 29, 1920. Discharge, Nov. 26–28, 1919, estimated.

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Monthly discharge of Soda Creek near Soda Springs, Idaho, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	60	51	57.3	3,520
November	63	57	61.0	3,630
December	57	48	54.0	3,320
January	51	38	41.5	2,550
February	43	41	42.0	2,330
March	123	41	48.2	2,960
April	231	75	106	6,310
May	83	67	73.9	4,540
June	67	54	60.9	3,620
July	58	54	55.8	3,430
August	54	51	51.3	3,150
September	58	51	51.3	3,050
The year	231	38	58.6	42,400
1919–20.				
October	60	54	55.5	3,410
November	83	58	62.5	3,720
December	58	51	54.1	3,330
January	51	46	49.3	3,030
February	51	46	47.6	2,740
March	58	46	48.3	2,970
April	179	48	84.5	5,030
May	113	78	85.0	5,230
June	123	60	71.2	4,240
July	86	65	72.6	4,460
August	75	66	67.5	4,150
September	75	66	69.3	4,120
The year	179	46	64.0	46,400

LOGAN RIVER ABOVE STATE DAM, NEAR LOGAN, UTAH.

LOCATION.—In NE. ¼ sec. 36, T. 12 N., R. 1 E., at Logan plant of Utah Power & Light Co., 125 feet above confluence of tailrace with river and 2½ miles above Logan, Cache County.

DRAINAGE AREA.—218 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 7, 1913, to September 30, 1920. June 1, 1896, to July 17, 1903, and April 14, 1904, to December 31, 1912, at old station a quarter of a mile downstream; flow at present station plus that of tailrace comparable to that at old station.

GAGE.—Stevens continuous water-stage recorder on right bank about 100 feet west of power house, installed May 7, 1913; inspected by operator of power plant. Also inside hook and outside vertical staff gages.

DISCHARGE MEASUREMENTS.—Made by wading at gage; high-water measurements made from cable 400 feet downstream and flow in tailrace deducted.

CHANNEL AND CONTROL.—Banks high, clean, and not subject to overflow; right bank is a dry rubble retaining wall. Control is a concrete cut-off wall about 6 feet below the gage.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 3.46 feet at 5 p. m. May 30 (discharge, 709 second-feet); minimum stage from water-stage recorder, 0.91 foot at 7 a. m. October 13 (discharge, 21 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 4.27 feet at 7 a. m. May 30 (discharge, 1,230 second-feet); minimum stage, from water-stage recorder, 1.00 foot at noon November 1 (discharge, 25 second-feet).

1913–1920: Maximum stage recorded, 5.6 feet at 9.30 a. m. March 21, 1916 (discharge estimated, 2,000 second-feet); minimum discharge, 8 second-feet December 11, 1915.

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Ice.—Stage-discharge relation seldom affected by ice.

Backwater.—Stage-discharge relation affected at times by backwater from State dam, one-half mile downstream.

Diversions.—Utah Power & Light Co. diverts water above station for power, and the Logan, Hyde Park & Smithfield canal diverts for irrigation. The city of Logan has a municipal power plant about 2 miles above station, but water is returned to river above the two diversions noted. The city of Logan is entitled to divert for municipal supply, from 4 to 10 second-feet of water, from springs in sec. 22, T. 12 N., R. 2 E., the quantity depending on the flow in the river.

Regulation.—Some diurnal fluctuation is caused at times by the operation of the two power plants.

Accuracy.—Stage-discharge relation not permanent; affected by ice November 22 to December 2, December 16–19, 27–29, 1918, and January 9–16, 1919; affected by backwater from state dam several times from March 29 to September 30, 1919. Standard rating curve used for year ending September 30, 1919, well defined. Curve used for year ending September 30, 1920, well defined below 600 second-feet and fairly well defined above. Operation of water-stage recorder satisfactory except for October 1–5 and 13–18, 1918, December 14–26, 1919, January 1, 2, January 23 to February 20, and August 1 to September 30, 1920, and a few days scattered through the year. Staff gage read to hundredths twice a day until September 30, 1919, and once daily thereafter. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph by inspection. For periods of backwater, discharge estimated from studies of river and Utah Power & Light Co.'s tailrace. Records fair for 1919 and good for 1920.

Cooperation.—Gage-height record and numerous discharge measurements furnished by Utah Power & Light Co.

Discharge measurements of Logan River above State dam, near Logan, Utah, during the years ending September 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 12	A. B. Purton	1.01	28.6	Oct. 24	R. P. Flagel	1.20	41.0
				Dec. 4	do	1.64	96
1919.				1920.			
Jan. 28	do	1.58	91	Jan. 22	do	1.27	48.0
Apr. 22	Monson and Stoner [a]	2.05	146	Feb. 21	do	1.19	43.0
May 22	L. C. Monson	3.07	525	Apr. 21	do	2.08	169
June 5	do	2.70	378	May 26	do	3.97	1,190
July 9	do	1.64	79	June 15	do	3.62	686
25	H. L. Stoner	1.35	63	Aug. 3	do	1.72	129
Sept. 22	J. W. Bones	1.15	43.5	31	A. B. Purton	1.50	94
28	R. P. Flagel [a]	1.45	39.8				

[a] Engineers for Utah Power & Light Co.

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Daily discharge, in second-feet, of Logan River above State dam, near Logan, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	28	35	60	74	96	57	152	356	465	84	60	44
2	28	32	63	79	94	58	146	338	404	80	57	48
3	32	31	58	83	97	57	152	321	366	82	56	51
4	35	33	56	87	97	54	146	299	306	80	55	49
5	32	31	68	103	97	56	137	299	348	83	50	48
6	45	55	57	100	98	57	114	266	315	78	49	45
7	35	29	56	100	100	58	106	272	302	82	49	44
8	30	30	48	102	97	58	100	296	290	106	49	44
9	30	31	48	102	96	57	100	328	278	80	58	42
10	28	31	47	102	100	56	102	312	261	76	71	40
11	42	31	45		102	55	104	374	255	78	52	39
12	39	30	46		102	57	110	486	247	74	46	39
13	29	31	49		100	54	119	504	233	75	46	40
14	29	31	49	115	97	70	112	508	220	76	46	38
15	37	33	45		94	59	114	554	210	78	43	40
16	35	32			89	55	119	597	198	79	40	39
17	37	30		102	94	54	137	554	191	82	41	38
18	37	31	40	102	94	56	128	512	182	82	45	43
19	32	32		100	93	56	119	512	165	79	47	45
20	32	31	47	100	86	57	137	535	163	73	45	44
21	34	34	47	98	71	64	137	549	154	74	44	44
22	34		47	98	55	57	163	549	144	71	43	42
23	34		47	98	55	64	191	558	140	69	42	
24	33		47	96	59	65	228	582	138	64	43	
25	33		70	97	56	65	249	592	133	58	40	42
26	32	60	93	97	55	109	238	577	115	62	42	
27				100	57	117	241	563	108	62	45	
28			73	98	64	122	281	563	103	61	46	40
29	33			93	.....	119	325	577	100	60	45	40
30			74	94	.....	135	366	641	98	59	44	40
31		.....	76	96	.....	133	.....	558	.....	59	44	.....
1919-20.												
1		27	61	48	44	43	50	411	1,080	472	114	96
2		28	54	50	48	44	51	403	1,050	434	113	94
3		34	51	50	44	43	51	364	960	418	130	94
4	40	38	57	49	44	42	49	403	967	394	130	96
5		38	49	51	45	43	54	448	1,030	368	113	94
6		50	48	49	44	42	52	474	1,060	342	121	94
7	39	34	46	46	43	40	51	538	1,060	317	116	91
8	39	35	48	41	42	41	62	600	1,030	294	109	92
9	39	33	44	42	44	44	86	630	1,050	279	102	88
10	39	38	61	44	40	43	104	730	1,050	270	116	88
11	39	35	66	49	38	44	98	610	973	253	104	75
12	35	35	63	54	43	43	118	615	942	239	89	80
13	38	33	47	53	46	43	156	630	936	226	108	80
14	42	33	48	53	44	43	177	610	894	214	86	76
15	42	35	50	58	43	45	193	610	842	209	76	74
16	44	42	51	58	42	43	202	666	791	207	81	72
17	40	43	52	55	40	44	190	736	802	200	99	70
18	38	38	55	52	41	4	181	849	736	191	121	72
19	43	38	54	53	42		181	908	689	184	118	72
20	42	38	50	53	42	42	186	980	668	173	114	73
21	39	38	49	51	43	42	175	956	673	161	113	74
22	39	38	52	48	46	52	164	1,040	668	156	111	74
23	39	38	47	49	45	55	160	1,070	668	148	109	74
24	40	38	48	47	44	54	162	1,090	633	148	116	80
25	44	39	48	49	42	56	166	1,120	594	139	111	96
26	42	38	47	48	45	52	152	1,080	561	132	109	94
27	38	70	46	48	42	48	141	1,060	524	128	113	86
28	31	49	47	46	42	54	181	1,060	506	125	111	92
29	33	58	48	48	40	51	235	1,060	520	121	101	81
30	31	59	47	46	.....	49	308	1,130	520	118	97	84
31	28	.....	45	45	.....	52	.....	1,150	.....	111	96	.....

NOTE.—Discharge, Apr. 18, July 28, 29, Aug. 21, 22, and Dec. 14-18, 1919, interpolated. Braced figures show estimated mean discharge for periods indicated.

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Monthly discharge of Logan River above State dam, near Logan, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	45	28	33.5	2,060
November	.....	29	40.8	2,430
December	93	45	55.5	3,410
January	.....	74	99.5	6,120
February	102	55	85.5	4,750
March	135	54	70.7	4,350
April	366	100	162	9,640
May	641	266	469	28,800
June	465	98	223	13,300
July	106	58	74.4	4,570
August	71	40	47.8	2,940
September	51	38	42.5	2,530
The year	641	28	117	84,900
1919-20.				
October	44	28	38.8	2,390
November	70	27	39.7	2,360
December	66	44	50.9	3,130
January	58	41	49.5	3,040
February	48	38	43.0	2,470
March	56	40	46.3	2,850
April	308	49	138	8,210
May	1,150	364	775	47,700
June	1,080	506	816	48,600
July	472	111	231	14,200
August	130	76	108	6,640
September	96	70	83.5	4,970
The year	1,150	27	202	146,000

UTAH POWER & LIGHT CO.'S TAILRACE NEAR LOGAN, UTAH.

LOCATION.—In NE. ¼ sec. 36, T. 12 N., R. 1 E., 100 feet below power house at plant of Utah Power & Light Co., 2½ miles above Logan, Cache County.

RECORDS AVAILABLE.—May 7, 1913, to September 30, 1920.

GAGE.—Friez water-stage recorder on right bank just above weir; installed May 7, 1913; inspected by plant operator. Also inside hook and outside vertical staff gages.

DISCHARGE MEASUREMENTS.—Made from a footbridge just above gage.

CHANNEL AND CONTROL.—A rectangular wooden weir, with a metal crest strip, just below gage acts as control. Capacity of channel above weir not sufficient to eliminate all velocity of approach. Length of crest, 17.7 feet. Stage of zero flow, zero on gage.

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—Flow at station affected by operation of power plant.

ACCURACY.—Stage-discharge relation permanent; rating curve well defined for range of stage which occurred. Operation of water-stage recorder satisfactory only from March 16 to August 2, 1919, and September 13, 1919, to September 30, 1920. Staff gage read to hundredths twice a day. Daily discharge ascertained by applying daily mean gage height to rating table except as follows: Discharge, October 11, 12, November 6, and December 5, 6, 1918, January 17, February 20, 21, July 8, and August 9-11, 1919, estimated from comparative study of flow in Logan River. Power plant shut down April 13-25, and May 1-12, 1920; leakage through turbines estimated 3 second-feet. Records good.

COOPERATION.—Gage-height record and 14 discharge measurements furnished by Utah Power & Light Co.

Canal diverts water from right bank of Logan River in SE. ¼ SW. ¼ sec. 29, T. 12 N., R. 2 E. Water is returned to river 125 feet below gaging station on Logan River above State dam in NE. ¼ sec. 36, T. 12 N., R. 1 E. Water is used for power development.

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Discharge measurements of Utah Power & Light Co.'s tailrace near Logan, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 11	A. B. Purton	0.49	22.2	Sept. 28	R. P. Flagel [a]	1.10	89
				Oct. 24	do	1.09	83
1919.				1920.			
Jan. 28	do	.35	14.5	Jan. 22	do	.80	47.8
Apr. 22	Monson and Stoner	1.08	76	Feb. 21	do	.92	64
May 20	L. C. Monson [a]	1.08	80	Apr. 21	do	.07	3.0
June 5	do	1.08	77	May 26	do	1.13	84
22	do	1.08	77	June 15	do	1.12	83
July 9	do	1.10	84	Aug. 3	do	1.06	77
25	H. L. Stoner [a]	1.08	75	31	A. B. Purton	1.07	72
Sept. 22	J. W. Bones	1.11	81				

[a] Engineer for Utah Power & Light Co.

Daily discharge, in second-feet, of Utah Power & Light Co.'s tailrace near Logan, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	114	109	76	21	7	56		78	79	79	78	78
2	114	107	72	29	12	53		79	79	79	78	78
3	114	104	82	33	13	56		79	78	79	78	78
4	114	104	84	27	13	54		79	78	79	78	79
5	115	104	72	10	13	56		78	78	79	78	78
6	119	79	83	15	13	58		78	78	79	78	79
7	119	104	84	12	13	56		79	78	79	78	80
8	119	104	87	11	13	54		78	78	55	78	80
9	115	104	89	11	13	49		78	78	81	68	80
10	115	101	84	11	13	50	0	79	78	79	55	80
11	99	103	68		13	48		79	79	74	73	80
12	100	104	76		13	50		79	79	80	78	80
13	109	107	82		13	50		80	78	80	78	80
14	109	106	79	0	13	59		80	78	80	78	79
15	114	109	76		13	50		80	78	80	78	79
16	113	107	80		13	51		82	78	79	78	79
17	119	98	84	13	13	55		82	80	79	77	79
18	120	102	80	13	12	53	12	82	80	80	78	80
19	116	99	78	12	16	50	74	80	80	79	78	81
20	118	98	71	12	24	54	77	82	80	79	78	79
21	115	98	74	12	41	64	77	84	78	79	78	78
22	113	98	70	12	59	64	77	80	78	80	77	79
23	113	76	65	16	64	66	78	80	79	80	78	80
24	112	82	56	15	60	66	77	80	78	79	78	79
25	109	71	42	13	57	64	79	80	78	78	78	78
26	108	66	29	13	54	19	78	80	77	78	78	78
27	108	73	48	12	56		78	81	78	79	78	77
28	112	69	53	11	58		78	80	78	78	78	82
39	114	71	58	10	.....	0	79	79	77	78	78	82
30	108	72	56	8	.....		80	24	71	78	79	83
21	109	.....	35	7	.....		.....	57	.....	78	78	.....

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Daily discharge, in second-feet, of Utah Power & Light Co.'s tailrace near Logan, Utah, for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	83	80	48	54	60	52	64		78	87	77	77
2	83	79	50	50	62	55	62		77	83	76	74
3	83	78	55	52	62	60	56		82	83	74	73
4	80	77	45	53	62	55	57		83	79	74	76
5	80	76	56	54	64	55	56		83	77	74	78
6	80	54	57	53	64	55	58	3	83	79	74	78
7	80	78	58	54	62	52	58		80	80	74	78
8	80	78	55	46	61	53	59		84	80	76	78
9	80	72	53	46	61	56	62		83	81	65	78
10	81	77	53	44	59	57	69		82	81	60	78
11	79	78	57	41	58	57	65		83	83	72	80
12	80	72	62	44	59	55	38		83	82	74	79
13	80	64	44	44	60	58		55	83	82	62	78
14	80	71	44	45	57	56		80	83	82	68	78
15	80	74	44	44	56	58		79	82	83	70	79
16	78	76	44	44	58	53	3	79	82	83	71	79
17	80	77	44	47	60	56		82	84	83	72	77
18	80	78	48	45	61	55		82	84	82	74	76
19	82	78	50	46	60	33		80	84	82	74	80
20	82	79	52	49	61	56		80	83	82	76	79
21	82	76	58	50	60	59	3	80	83	82	77	77
22	82	77	58	52	60	59		79	82	81	76	77
23	80	78	57	55	61	61	3	73	82	81	77	77
24	79	80	56	52	62	64		77	83	82	78	77
25	80	79	58	51	58	67		70	82	81	79	78
26	82	78	58	49	50	67	30	74	82	81	81	79
27	82	73	60	51	53	64	65	82	86	79	80	80
28	78	51	56	57	59	62	69	82	83	78	80	82
29	79	47	52	59	52	62	73	82	80	77	79	82
30	82	50	54	62	.....	61	63	80	86	77	78	81
31	77	.....	44	62	.....	66	.....	78	.....	77	77	.....

Monthly discharge of Utah Power & Light Co.'s tailrace near Logan, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	120	99	113	6,950
November	109	66	94.3	5,610
December	89	29	70.1	4,310
January	33	0	11.6	713
February	64	7	25.6	1,420
March	66	0	45.3	2,790
April	80	0	31.5	1,870
May	84	24	77.3	4,750
June	80	71	78.1	4,650
July	80	55	78.2	4,810
August	79	55	76.7	4,720
September	83	77	79.4	4,720
The year	120	0	65.3	47,300
1919-20.				
October	83	77	80.5	4,950
November	80	47	72.8	4,330
December	62	44	52.6	3,230
January	62	41	50.2	3,090
February	64	50	59.4	3,420
March	67	33	57.4	3,530
April	73	3	34.8	2,070
May	82	3	48.7	2,990
June	86	77	82.5	4,910
July	87	77	81.0	4,980
August	81	60	74.2	4,560
September	82	73	78.1	4,650
The year	87	3	64.3	46,700

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LOGAN, HYDE PARK & SMITHFIELD CANAL NEAR LOGAN, UTAH.

LOCATION.—In NW. ¼ NE. ¼ sec. 31, T. 12 N., R. 2 E., at concrete rating flume half a mile below head of canal, 1 mile below city power plant, 1 mile above plant of Utah Power & Light Co., and 3½ miles from Logan, Cache County.

RECORDS AVAILABLE.—Fragmentary records 1904–1912. Fairly continuous records April 22, 1912, to September 30, 1920.

GAGE.—Stevens continuous water-stage recorder on right bank near lower end of rating flume; installed June 6, 1913.

DISCHARGE MEASUREMENTS.—Made from a footplank at the flume or by wading.

CHANNEL AND CONTROL.—Rectangular concrete rating flume. Stage of zero flow, determined January 28, 1919, 0.40 foot.

ICE.—Recording gage usually removed during winter.

DIVERSIONS.—None above the gage.

REGULATION.—Flow regulated by head gates at diversion works.

ACCURACY.—Stage-discharge relation changed by material washed into canal by break in power canal on hill above on September 8, 1918. Material removed in following winter and stage-discharge relation practically same as before, after December, 1918. Rating curves well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph, except October 2–11, 1918, May 2, 5–9, and 19–21, 1919, and August 9–10, 1920, for which discharge was interpolated because of no gage-height record. No record November 7, 1918, to April 30, 1919, and October 11, 1919, to May 6, 1920. Canal practically empty during winter. No flow May 12–17, 1919, and May 20–26, 1920. Records good.

Canal diverts water from Logan River in NE. ¼ NE. ¼ sec. 31, T. 12 N., R. 2 E., for irrigation and domestic use in the territory north of Logan.

Discharge measurements of Logan, Hyde Park & Smithfield canal near Logan, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
1918.				1920.			
Oct. 12	A. B. Purton	1.22	24.4	Aug. 31	A. B. Purton	1.52	51
1919.							
Jan. 28	do	.55	2.7				
Sept. 22	J. W. Bones	.80	15.5				

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Daily discharge, in second-feet, of Logan, Hyde Park & Smithfield canal near Logan, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	May.	June.	July.	Aug.	Sept.
1918–19.							
1	25	15	107	105	80	36	28
2		15	107	101	79	36	28
3		15	107	98	78	36	28
4		15	107	97	75	37	27
5		15	108	97	68	38	26
6	25	15	109	97	67	38	26
7		.....	110	101	58	38	26
8		.....	112	108	52	38	26
9		.....	113	107	52	38	26
10		.....	114	111	51	38	26
11		.....	62	114	51	40	26
12	25	.....	0	115	51	38	26
13	20	.....	0	116	50	34	26
14	15	.....	0	113	51	34	26
15	15	.....	0	112	50	40	26
16	15	.....	0	113	50	49	26
17	15	.....	0	115	49	47	26
18	15	.....	107	115	51	42	20
19	15	.....	109	118	52	38	15
20	15	.....	111	118	52	36	15
21	15	.....	113	118	52	36	15
22	15	.....	115	117	52	34	15
23	15	.....	115	114	52	32	15
24	15	.....	117	97	54	32	15
25	15	.....	117	80	56	32	15
26	15	.....	116	79	57	28	15
27	15	.....	115	78	46	26	15
28	15	.....	115	78	36	26	15
29	15	.....	113	77	36	26	14
30	15	.....	112	78	35	26	14
31	15	.....	109	.....	35	26	.....

Day.	Oct.	May.	June.	July.	Aug.	Sept.	Day.	Oct.	May.	June.	July.	Aug.	Sept.
1919–20.							**1919–20.**						
1	14	.....	116	115	111	51	16	.....	62	111	117	103	50
2	14	.....	114	113	111	51	17	.....	91	111	116	87	50
3	14	.....	114	112	110	51	18	.....	101	110	115	53	50
4	14	.....	114	112	105	51	19	.....	67	109	114	53	50
5	14	.....	114	116	101	51	20	.....	0	113	117	53	50
6	14	.....	114	117	94	51	21	.....	0	116	120	52	50
7	14	22	114	117	86	51	22	.....	0	116	120	52	50
8	14	24	114	117	94	51	23	.....	0	117	121	52	51
9	13	24	115	116	96	51	24	.....	0	117	120	52	51
10	12	22	115	115	98	51	25	.....	0	118	117	53	51
11	.....	38	114	114	101	50	26	.....	0	120	117	53	50
12	.....	48	114	113	100	50	27	.....	46	121	116	52	50
13	.....	51	114	113	100	50	28	.....	98	123	115	52	50
14	.....	54	114	114	102	50	29	.....	112	123	113	52	50
15	.....	54	113	117	103	50	30	.....	115	120	113	51	50
							31	.....	116	.....	112	51	.....

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Monthly discharge of Logan, Hyde Park & Smithfield canal near Logan, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October		15	19.0	1,170
November 1–6	15	15	15.0	179
May	117	0	88.4	5,440
June	118	77	103	6,130
July	80	35	54.1	3,330
August	49	26	35.3	2,170
September	28	14	21.6	1,290
1919–20.				
October 1–10	14	12	13.7	272
May 7–31	116	0	45.8	2,270
June	123	109	115	6,840
July	121	112	116	7,130
August	111	51	78.5	4,830
September	51	50	50.4	3,000

BLACKSMITH FORK ABOVE UTAH POWER & LIGHT CO.'S DAM, NEAR HYRUM, UTAH.

LOCATION.—In NE. ¼ sec. 8, T. 10 N., R. 2 E., 1 mile above diversion dam and 3½ miles above power plant of Utah Power & Light Co. and 6 miles east of Hyrum, Cache County.

DRAINAGE AREA.—About 260 square miles (measured on topographic maps and map of Cache National Forest).

RECORDS AVAILABLE.—July 19, 1900, to December 31, 1902, and November 28, 1913, to September 30, 1920.

GAGE.—Stevens continuous water-stage recorder on left bank 500 feet above wagon bridge and nearly a mile above dam; installed November 28, 1913; inspected by watchman at dam. Also, inside float and vertical staff and outside inclined staff gages.

DISCHARGE MEASUREMENTS.—Made by wading about four-tenths of a mile above gage, or from cable a quarter of a mile above gage. Conditions at wading section good; at cable poor, especially at high stages.

CHANNEL AND CONTROL.—Bed rough but fairly permanent; one channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 2.44 feet at 4 a. m. April 24 (discharge, 289 second-feet); minimum stage 1.2 feet at 8 a. m. January 1 on outside gage (discharge, 64 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 4.21 feet at 5 a. m. May 22 (discharge, 880 second-feet); minimum stage, from reading on inside staff gage, 0.98 foot on December 15 (discharge, 39 second-feet).

1913–1920: Maximum stage determined by levels from high-water mark in well, 6.5 feet May 15, 1917 (discharge estimated by extending rating curve, 1,620 second-feet); minimum stage, 0.85 foot at 6 a. m. February 6, 1916 (discharge estimated from an extension of rating curve, 22 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Above all important diversions.

REGULATION.—None.

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ACCURACY.—Year ending September 30, 1919: Stage-discharge relation changed slightly December 24 and April 16. Outside and inside gages are independently rated. Rating curves fairly well defined. Operation of water-stage recorder satisfactory only October 1–4, April 4 to May 20, and July 25 to September 30. Outside gage read twice a day to hundredths November 28 to April 3. Inside float gage read twice a day to hundredths during the rest of the year, but as intake pipe was obstructed May 21 to July 24 the record for that period is useless. Daily mean gage height determined as follows: October 1–4 from recorder graph; October 5 to November 27, mean of two readings a day on inside gage; November 28 to April 3, mean of two readings a day on outside gage; April 4 to May 20, from recorder; May 21 to July 24, not determined; July 25 to September 30, from recorder. Daily discharge ascertained by applying daily mean gage height to rating table. Discharge May 14 to July 24 interpolated between measurements. Records fair.

Year ending September 30, 1920: Stage-discharge relation for medium and high stages changed during period of low water in December. Rating curve used until December 15, fairly well defined; curve for remainder of year well defined. Operation of water-stage recorder satisfactory except for most of November, December, and January and a few days in October, February, March, and April. Inside staff gage read twice a day to hundredths. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph where available. For other days the means of two daily staff gage readings were used. Discharge November 28 interpolated. Records good.

COOPERATION.—Gage-height record and 16 discharge measurements furnished by Utah Power & Light Co.

Discharge measurements of Blacksmith Fork above Utah Power & Light Co.'s dam, near Hyrum, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.		Discharge.
		Inside gage.	Outside gage.	
1918.		*Feet.*	*Feet.*	*Sec.-feet.*
Oct. 5	L. C. Monson [a]	1.65	1.65	123
12	A. B. Purton	.....	1.62	100
1919.				
Jan. 28	.....do	.....	1.36	80
Apr. 23	Monson and Stoner	2.16	2.25	224
May 20	L. C. Monson	1.84	1.86	163
June 5	.....do	1.60	1.74	128
22	.....do	1.42	1.53	102
July 9	.....do	1.38	1.48	76
25	H. L. Stoner [a]	1.48	1.43	83
Sept. 22	J. W. Bones	1.45	1.42	78
28	R. P. Flagel [a]	1.46	1.40	84
Oct. 16	.....do	1.42	1.40	74
Dec. 3	.....do	1.37	1.34	68
1920.				
Jan. 23	.....do	1.34	.....	68
Feb. 20	.....do	1.34	.....	67
Apr. 22	.....do	1.81	.....	153
May 28	.....do	2.94	.....	467
June 15	.....do	2.06	.....	214
Aug. 3	.....do	1.76	.....	137
31	A. B. Purton	1.64	.....	122

[a] Engineer for Utah Power & Light Co.

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Daily discharge, in second-feet, of Blacksmith Fork above Utah Power & Light Co.'s dam, near Hyrum, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	98	95	89	66	78	82	146	239			85	80
2	98	95	89	77	78	83	144	224	130		84	85
3	103	95	89	82	78	83	148	214			84	83
4	111	95	89	82	78	82	155	204			83	84
5	104	95	89	82	79	82	146	194	128	90	82	83
6	112	95	89	82	82	82	131	184			80	82
7	106	95	89	82	84	82	124	179			82	83
8	101	95	91	78	79	79	116	174			82	82
9	101	92	91	78	82	78	114	169		84	82	79
10	101	91	87	78	82	78	127	169			82	79
11	101	91	86	78	84	78	124	165			80	78
12	100	91	86	78	84	78	124	162			80	78
13	98	91	86	78	84	78	124	160			79	78
14	98	91	86	78	82	82	122		115		79	78
15	98	95	86	78	82	82	124				79	79
16	98	95	86	78	82	82	124	160			77	80
17	98	91	86	79	79	79	127			83	77	80
18	98	91	86	82	78	82	151				78	79
19	98	91	86	82	82	83	169				78	79
20	98	91	86	82	82	85	174	160			78	78
21	98	91	86	82	82	99	206				78	78
22	98	91	86	82	82	113	224		102		78	78
23	97	84	85	82	82	131	246				78	78
24	95	91	84	82	82	131	249				78	78
25	95	91	84	82	82	131	212			82	78	78
26	95	91	84	82	82	129	206	145	98	83	79	78
27	95	91	84	78	84	129	222			84	78	79
28	91	91	84	78	83	129	239			84	79	79
29	95	91	84	78	.....	139	252			87	77	80
30	95	89	84	78	.....	137	246			84	77	80
31	95	.....	78	78	.....	150	.....		.....	83	78	.....
1919–20.												
1	87	77	72	69	71	68	89	303	364	175	141	128
2	85	77	77	68	73	71	91	318	338	173	145	128
3	82	69	69	70	73	71	89	309	320	170	148	128
4	80	77	70	70	71	69	88	367	312	168	141	126
5	78	77	71	70	69	69	91	449	306	168	141	128
6	78	77	70	70	69	69	104	492	292	166	139	130
7	78	78	70	70	69	68	108	565	281	166	139	130
8	79	77	68	68	68	69	139	635	272	164	137	130
9	80	76	48	69	67	73	154	698	261	159	137	130
10	82	74	60	69	68	80	159	777	250	154	137	128
11	83	76	71	68	69	77	152	744	245	152	132	124
12	83	72	70	68	70	74	152	645	237	152	132	122
13	78	72	64	69	70	77	159	694	224	152	132	122
14	78	70	40	69	65	81	234	678	219	150	132	122
15	82	72	39	70	65	73	199	662	212	148	130	122
16	78	72	40	71	65	74	261	662	214	150	126	122
17	74	72	56	71	65	73	199	662	212	150	128	120
18	77	74	75	71	65	70	173	691	209	150	126	118
19	77	72	74	70	67	73	150	678	204	150	126	120
20	77	72	74	69	68	75	157	652	199	148	126	116
21	77	72	73	69	68	77	161	626	192	145	126	116
22	77	72	73	69	69	86	164	767	185	143	126	120
23	77	72	73	68	69	83	164	678	182	145	126	126
24	77	72	73	68	68	81	159	662	180	150	124	124
25	77	72	73	68	65	83	159	603	180	145	128	124
26	78	72	73	71	68	88	164	823	180	145	134	120
27	78	70	73	73	69	86	170	474	177	143	132	118
28	77	68	70	71	69	85	204	464	177	143	134	114
29	77	67	73	70	68	81	267	443	180	143	130	112
30	77	74	74	70	.....	86	284	433	177	143	130	110
31	77	.....	74	70	.....	97	.....	400	.....	141	130	.....

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Monthly discharge of Blacksmith Fork above Utah Power & Light Co.'s dam, near Hyrum, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	112	91	99.0	6,090
November	95	84	92.1	5,480
December	91	78	86.3	5,310
January	82	66	79.4	4,880
February	84	78	81.4	4,520
March	150	78	98.0	6,030
April	252	114	167	9,940
May	239	.....	166	10,200
June	.....	.....	112	6,660
July	.....	.....	85.0	5,230
August	85	77	79.0	4,890
September	85	78	79.8	4,750
The year	252	66	102	73,980
1919-20.				
October	87	74	78.9	4,850
November	78	67	73.1	4,350
December	77	39	67.1	4,130
January	73	68	69.5	4,270
February	73	65	68.3	3,930
March	97	68	77.0	4,730
April	284	88	161	9,580
May	777	303	573	35,200
June	364	177	233	13,900
July	175	141	153	9,410
August	148	124	133	8,180
September	130	110	123	7,320
The year	777	39	151	110,000

WEST SIDE CANAL NEAR COLLINSTON, UTAH.

LOCATION.—In NW. ¼ sec. 34, T. 13 N., R. 2 W., at Wheelon siding on Oregon Short Line Railroad, 600 feet below penstock of Utah Power & Light Co.'s Wheelon plant, 1,000 feet northwest of gaging station on Bear River, and 4 miles north of Collinston, Box Elder County.

RECORDS AVAILABLE.—June 1, 1912, to September 30, 1920.

GAGE.—Friez water-stage recorder on left bank installed May 22, 1914, at same site and datum as inclined gage used prior to that time.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage or by wading.

CHANNEL AND CONTROL.—Bed composed of earth and gravel. Banks steep and clean. Control not well defined; stage-discharge relation is affected probably by vegetal growth and slight silt deposit.

ICE.—Stage-discharge relation seriously affected at times by ice.

DIVERSIONS.—Water is taken out of canal about 600 feet above gage, for the power plant, and, if necessary, water can also be siphoned across the river to the Hammond canal.

REGULATION.—Flow can be regulated at the head gates and also at the forebay of the power plant.

COOPERATION.—Records of daily discharge and 25 discharge measurements furnished by Utah Power & Light Co.

Canal diverts water from west side of Bear River in SW. ¼ sec. 23, T. 13 N., R. 2 W., by means of a low diversion dam. Part of the water is used through the Wheelon plant of Utah Power & Light Co. about 1½ miles below; the rest which passes the gaging station is used for irrigation on west side of river. When cleaning or repairing the Hammond canal in the canyon, water can be siphoned across the river at the power plant from the West Side canal.

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Discharge measurements of West Side canal near Collinston, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 7	L. C. Monson [a]	5.48	269	Sept. 29	R. P. Flagel [a]	5.98	361
Dec. 17	do	2.55	35.9	Oct. 15	do	4.55	196
				25	do	3.66	114
1919.				Nov. 18	do	3.42	98
Jan. 29	A. B. Purton	2.55	35.6	Dec. 15	do	[b] 3.30	49.2
Mar. 4	L. C. Monson	1.69	27.9	29	do	[b] 3.04	33.9
Apr. 22	Monson and Stoner	−.2	0				
May 21	L. C. Monson	7.25	516	1920.			
26	do	7.38	544	May 13	do	2.12	74
June 5	do	6.85	487	25	do	.28	4.0
25	do	7.40	531	June 18	do	6.61	572
July 10	do	7.44	539	July 19	do	6.68	609
26	H. L. Stoner [a]	7.45	575	29	do	6.70	601
Sept. 9	L. C. Monson	5.62	308	Aug. 26	do	6.60	580
10	do	5.57	307	Sept. 1	A. B. Purton	4.97	351

[a] Hydrographer for Utah Power & Light Co. [b] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of West Side canal near Collinston, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	359	142	68	61	57	49		40	365	512	522	436
2	322	134	66	80	59	49		58	357	501	521	341
3	300	133	52	80	61	49		120	397	499	516	329
4	295	138	52	70	61	49		123	437	496	521	310
5	284	133	43	70	57	49		120	449	498	521	308
6	277	136	40	80	59	49		172	449	499	510	308
7	273	132	40	80	57	47	0	221	439	523	487	311
8	307	125	50	80	57	49		244	449	548	484	310
9	286	140	50	80	57	47		267	456	552	512	303
10	238	137	48	80	61	49		278	491	554	512	330
11	246	136	43	80	65	49		373	546	554	510	360
12	258	156	47	80	61	49		363	546	484	515	442
13	258	148	46	80	61	49		386	550	527	539	456
14	253	144	40	80	63	49	30	433	546	551	537	445
15	289	140	30	80	61	51	61	484	537	551	537	442
16	278	148	30	80	63	59	61	521	537	551	539	445
17	276	148	36	80	61	53	30	515	512	552	539	448
18	241	149	40	80	63	51		509	505	552	539	428
19	236	144	40	80	61	53		506	557	552	540	411
20	230	140	37	80	51	51		508	545	551	539	411
21	225	142	40	80	51	53		522	527	552	540	414
22	289	140	40	80	42	53		518	491	554	540	407
23	273	136	44	80	38	53		531	520	554	539	390
24	257	140	40	65	38	53	0	524	542	554	536	386
25	265	132	40	80	49			539	545	552	530	341
26	218	128	40	63	49			541	536	551	530	398
27	182	132	40	57	49	0		542	531	554	533	399
28	175	65	65	57	49			542	505	551	520	373
29	182	60	40	80	.....			524	509	551	509	317
30	174	66	46	61	.....			407	520	550	520	276
31	146	.....	36	57	.....		.....	373	.....	539	505	.....

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Daily discharge, in second-feet, of West Side canal near Collinston, Utah, for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	298	109	73	56	55	.....	.....	.....	518	589	597	326
2	267	109	74	53	55	.....	.....	.....	521	589	593	314
3	218	99	72	53	53	.....	.....	.....	514	585	585	330
4	211	105	76	53	53	.....	.....	.....	506	585	597	365
5	205	106	70	41	55	.....	.....	.....	521	581	597	396
6	186	102	70	63	53	.....	.....	.....	521	581	593	389
7	170	102	72	58	53	.....	.....	.....	521	589	593	368
8	179	102	75	56	53	.....	.....	.....	525	589	589	336
9	169	96	72	49	51	.....	.....	.....	545	593	569	375
10	175	105	58	63	53	.....	.....	.....	561	597	585	417
11	138	102	41	39	36	.....	.....	21	561	593	585	460
12	147	102	41	39	31	.....	.....	61	577	597	585	452
13	159	102	41	37	31	.....	.....	70	589	597	585	442
14	190	102	32	58	31	.....	.....	72	589	609	575	457
15	192	116	31	58	.....	.....	.....	72	589	609	577	452
16	201	105	29		.....	.....	.....	82	589	605	581	449
17	195	103	53		.....	.....	.....	92	589	605	585	414
18	199	105	49		.....	.....	.....	144	589	605	581	406
19	148	107	35		.....	.....	.....	159	585	601	577	435
20	101	108	41		.....	.....	.....	168	585	601	581	420
21	109	102	45		.....	.....	.....	159	581	601	581	368
22	120	102	37		.....	.....	.....	148	585	601	581	311
23	120	80	45		.....	.....	.....	165	585	601	569	308
24	122	88	53	55	.....	.....	.....	155	585	573	565	263
25	126	90	63		.....	.....	.....	25	589	573	585	194
26	128	90	53		.....	.....	.....	225	589	585	589	189
27	118	90	49		.....	.....	.....	330	585	585	452	202
28	98	68	31		.....	.....	.....	424	585	593	339	177
29	98	82	43		.....	.....	.....	464	589	597	378	157
30	114	75	35		.....	.....	.....	482	589	597	365	154
31	111	.....	55		.....	.....	.....	498	.....	597	336	.....

NOTE.—Canal dry Feb. 15 to May 10, 1920.

Monthly discharge of West Side canal near Collinston, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	359	146	255	15,700
November	156	60	131	7,800
December	68	30	44.2	2,720
January	80	57	74.9	4,610
February	65	38	55.8	3,100
March	59	0	39.1	2,400
April	61	0	6.1	360
May	542	40	381	23,400
June	557	357	496	29,500
July	554	484	538	33,100
August	540	484	524	32,200
September	456	276	375	22,300
The year	557	0	245	177,000
1919-20.				
October	298	98	162	9,960
November	116	68	98.5	5,860
December	76	29	52.1	3,200
January	63	37	53.4	3,280
February	55	0	22.9	1,320
March	0	0	0	0
April	0	0	0	0
May	498	0	130	7,990
June	589	506	565	33,600
July	609	573	594	36,500
August	597	336	550	33,800
September	460	154	344	20,500
The year	609	0	215	156,000

NOTE.—Monthly discharge computed by U. S. Geol. Survey.

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HAMMOND (EAST SIDE) CANAL NEAR COLLINSTON, UTAH.

LOCATION.—In NW. ¼ sec. 34, T. 13 N., R. 2 W., at Wheelon siding on Oregon short Line Railroad, 400 feet below penstock of Utah Power & Light Co. and 4 miles north of Collinston, Box Elder County.

RECORDS AVAILABLE.—June 1, 1912, to September 30, 1920.

GAGE.—Friez water-stage recorder on right bank, installed May 22, 1914, at same site and datum as inclined staff used until that date.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage or by wading.

CHANNEL AND CONTROL.—Bed composed of earth and gravel. Control not well defined.

DIVERSIONS.—Water is taken from this canal about 400 feet above the gage for the power plant.

REGULATION.—Flow can be regulated at the head gates and by means of a wasteway at the power-plant forebay; also affected by the operation of the plant.

COOPERATION.—Records of daily discharge and 17 discharge measurements furnished by Utah Power & Light Co.

Canal diverts water on the east side of Bear River in SW. ¼ sec. 23, T. 13 N., R. 2 W., at the same diversion dam as the West Side canal. Part of the water is used by the Wheelon plant of Utah Power & Light Co. and the rest is either wasted into the river or passes the gaging station for use in irrigation.

Discharge measurements of Hammond (East Side) canal near Collinston, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 7	L. C. Monson [a]	3.03	50	Oct. 15	R. P. Flagel	2.45	28.0
				25	do	1.69	10.5
1919.				Nov. 18	do	1.60	8.8
May 21	do	4.0	95	1920.			
June 25	do	4.11	100				
July 10	do	4.82	142	May 25	do	3.22	60
26	H. L. Stoner [a]	1.30	4.5	June 18	do	2.95	46.4
27	do	3.59	71	July 19	do	4.65	134
27	do	4.10	96	28	do	4.75	133
Sept. 9	L. C. Monson	5.78	83	Aug. 26	do	4.65	139
29	R. P. Flagel [a]	3.57	66	Sept. 1	A. B. Purton	3.66	78

[a] Hydrographer for Utah Power & Light Co.

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Daily discharge, in second-feet, of Hammond (East Side) canal near Collinston, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	May.	June.	July.	Aug.	Sept.
1918-19.							
1	72	11	12	60	86	117	125
2	71	11	12	61	80	118	111
3	74	11	11	62	84	117	82
4	72	9	19	63	82	119	91
5	63	7	31	60	89	121	86
6	51	7	46	58	90	128	69
7	48	7	53	58	93	128	69
8	20	8	66	57	108	127	71
9	32	5	74	56	130	126	80
10	18	5	71	57	126	125	80
11	10	5	86	70	88	124	80
12	10	5	74	76	126	126	81
13	10	5	88	75	114	127	95
14	10	4	80	80	126	127	95
15	10	4	94	86	127	130	95
16	10	5	99	69	128	134	95
17	10	5	91	88	130	136	95
18	10	5	93	87	136	135	95
19	10	5	94	99	46	137	96
20	11	5	99	97	4	135	95
21	11	5	100	108	4	134	95
22	11	5	95	113	4	135	93
23	11	5	98	110	19	136	93
24	11	5	96	107	7	131	92
25	11	5	97	102	78	125	93
26	11	5	97	103	7	125	93
27	11	5	96	98	46	125	91
28	11	.....	96	71	93	124	92
29	11	.....	86	91	92	124	78
30	11	.....	57	89	110	126	67
31	12	.....	60	.....	118	126	.....
1919-20.							
1	67	11	.....	96	115	129	63
2	74	12	.....	102	115	121	78
3	46	12	.....	108	113	128	78
4	29	12	.....	126	113	129	80
5	20	12	.....	136	113	129	80
6	29	9	.....	136	110	131	80
7	29	9	.....	136	123	131	80
8	29	9	.....	136	130	129	102
9	29	8	.....	137	130	128	102
10	29	8	.....	137	130	135	102
11	26	8	.....	129	126	131	115
12	34	8	.....	123	121	129	123
13	34	9	.....	123	126	129	123
14	34	9	.....	123	126	135	123
15	34	9	.....	118	131	135	122
16	23	9	.....	88	136	131	115
17	13	9	.....	44	140	129	96
18	10	9	.....	46	138	131	96
19	10	9	14	54	138	129	93
20	10	9	17	66	140	131	94
21	10	9	38	78	142	131	94
22	10	9	38	90	140	129	89
23	10	8	38	90	138	128	65
24	10	8	48	108	115	131	48
25	10	7	57	115	112	133	42
26	10	1	59	115	129	138	28
27	10	.....	78	115	140	48	24
28	10	.....	86	115	140	48	27
29	10	.....	85	115	138	46	27
30	10	.....	85	115	129	46	27
31	10	.....	85	.....	129	46	.....

NOTE.—No water in canal Nov. 28, 1918, to Apr. 30, 1919, and Nov. 27, 1919, to May 18, 1920.

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Monthly discharge of Hammond (East Side) canal near Collinston, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	74	10	24.0	1,480
November	11	0	5.5	325
December	0	0	0	0
January	0	0	0	0
February	0	0	0	0
March	0	0	0	0
April	0	0	0	0
May	100	11	73.3	4,510
June	113	56	80.4	4,780
July	136	4	82.9	5,100
August	137	117	127.	7,810
September	125	67	89.1	5,300
The year	137	0	40.5	29,300
1919–20.				
October	74	10	23.2	1,430
November	12	0	7.7	458
December	0	0	0	0
January	0	0	0	0
February	0	0	0	0
March	0	0	0	0
April	0	0	0	0
May	86	0	23.5	1,440
June	137	44	107	6,370
July	142	110	128	7,870
August	138	46	117	7,190
September	123	24	80.5	4,790
The year	142	0	40.7	29,500

NOTE.—Monthly discharge computed by U. S. Geol. Survey.

BOX ELDER CREEK NEAR BRIGHAM, UTAH.

LOCATION.—In SE. ¼ sec. 20, T. 9 N., R. 1 W., at highway bridge 0.3 mile below Brigham municipal power plant and 1.6 miles above Brigham, Box Elder County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 5, 1918, to September 30, 1920. Records were obtained May 20, 1909, to December 31, 1912, at the Third West Street bridge in Brigham.

GAGE.—Gurley 7-day graphic water-stage recorder in concrete shelter on left bank at upstream wing wall of highway bridge; established August 5, 1918; inspected by W. Wight. Also inside hook and outside vertical staff gages.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Channel steep and rough; composed of boulders and gravel. Banks not subject to overflow. One channel at all stages. Cut-off wall at lower side of concrete bridge, and paved channel under bridge form control. Stage of zero flow at gage height, 3.4 feet as determined August 5, 1918.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 4.62 feet at 6 p.m March 20 (discharge, 83 second-feet); minimum stage, 3.83 feet August 18–25 (discharge, 19 second-feet).

Maximum discharge during year ending September 30, 1920, 90 second-feet at 10 p.m. April 15; minimum stage, from water-stage recorder, 3.77 feet at 10 a.m. December 11 (discharge, 16 second-feet).

ICE.—Stream does not freeze over at this station.

DIVERSIONS.—Water is diverted below the station for irrigation around Brigham. There are also many diversions for irrigation from the tributaries above. Water diverted for Brigham municipal power plant is returned to the creek above the station.

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REGULATION.—A very slight regulation of flow is caused by operation of power plant above.

ACCURACY.—Stage-discharge relation changed a number of times during each year. Rating curves are based on from one or two measurements each and on slope of best defined curve. Because of small range in stage, rating curves are considered fairly well defined. Operation of water-stage recorder frequently unsatisfactory for short periods indicated in footnote to daily-discharge table from October 1, 1918, to January 29, 1920, when it was temporarily removed. Staff gage read twice a day to hundredths, January 31 to September 30, 1920. Daily discharge ascertained by applying daily mean gage height to rating table. Discharge for periods of faulty gage-height record estimated or interpolated. Records fair.

The discharge of Brigham municipal power plant tailrace which enters Box Elder Creek a short distance above this station may be determined by subtracting from the flow at this station, the flow of Box Elder Creek above the tailrace. Discharge measurements on Box Elder Creek above the tailrace appear in the list of miscellaneous discharge measurements. (See p. 329.)

Discharge measurements of Box Elder Creek near Brigham, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
1918.				1920.			
Oct. 11	A. B. Purton	4.14	26.0	Jan. 30	A. B. Purton	3.96	31.7
				May 4	W. E. Dickinson	4.42	72.
1919.				June 9	R. R. Rowe	4.03	25.2
Jan. 27	do	4.09	23.3	Sept. 1	A. B. Purton	3.90	20.9
June 3	L. W. Jordan	3.94	25.3				

Daily discharge, in second-feet, of Box Elder Creek near Brigham, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	26	28		23		28	48	46	26		22	23
2	26	28		23		28	48	47	26	25	22	23
3	26	28		22		30	50	43	25		21	23
4	26	29		23		30	46	42			22	24
5	30	29		23		30	42	42		26	22	23
					24				25			
6	37	29		23		29	42	42		26	22	22
7	29	29		23		29	42	39		26	22	22
8	26	29	26	22		29	41	41	26	25	21	22
9	25	30		22		30	38	40	25	26	22	22
10	25	30				30	39	38	25	26	22	22
11	25	29			46	31	45	36	25	26	22	23
12	25	29			31	31	42	37	24	26	21	22
13	25	30			29	31	46	35	24	25	22	22
14	25	31			29	32	47	35	21	25	22	22
15	25	34	24		29	30	43	35	21	25	22	22
16	25	33	24		29	33	43	35	21	26	21	23
17	26	31	24		29	36	44	34	21	26	20	22
18	27	31	24	23	28	42	48	32	21	25	19	22
19	27	31	24		28	50	50	31	22	25	19	21
20	27	31	24		28	63	50	31	21	24	19	22
21	27	30	24		28	61	50	32	21	24	19	22
22	26	30	24		28	56	51	31	21	24	19	22
23	27	29	24		29	56	52	31	21	24	19	22
24	27		24		29	49	50	32	21	23	19	22
25	27		24		29	46	51	33	22	24	19	22
26	27	28	23		28	43	49	32	21	24	20	22
27	29		23	23	28	42	47	32	21	26		22
28	31		23		28	44	48	33			21	24
29	29		23	23	.....	45	48	36	23	24		24
30	29		22		.....	46	48	35				25
31	28	.....	22		.....	54	.....	27	.....		22	.....

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Daily discharge, in second-feet, of Box Elder Creek near Brigham, Utah, for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	25	30	30		32	33	41	60	36	24	21	23
2	24	29	28		32	41	39	56	35	24	21	25
3	27	29	28		32	42	39	55	33	24	21	25
4	29	30	30		32	44	39	58	30	24	21	25
5	30	30	30		31	44	41	61	30	23	22	25
6	30	29	30		32	42	42	62	30	24	21	2
7	28	30	30		32	33	43	68	29	23	22	26
8	30	32	30		32	33	44	76	29	23	22	26
9	29	32	28		31	32	51	73	26	23	21	25
10	32	32	26		32	36	51	69	26	23	22	25
11	29	33	19		32	33	49	67	26	23	21	25
12	30	33	28		32	33	48	65	26	22	21	25
13	30	34	30		30	32	51	63	26	22	21	25
14	29	32	33		30	32	59	66	26	22	22	25
15	30	32	32	30	30	32	80	60	26	21	21	25
16	30	32	33		30	34	79	57	26	21	21	25
17	30	32	33		30	39	68	55	26	21	21	25
18	32	34	32		32	38	56	57	26	21	21	25
19	31	33	33		32	36	58	61	24	21	21	26
20	32	33	32		32	33	58	57	24	21	21	25
21	32	32	32		34	36	58	54	24	21	21	25
22	31	32	32		36	41	57	65	24	22	22	25
23	32	32	32		39	43	56	61	24	21	21	26
24	32		32		36	43	56	56	23	21	21	27
25	32		32		36	44	55	51	23	22	21	27
26	32	30	31		34	48	56	47	23	20	22	27
27	32		30		32	44	56	43	22	21	26	26
28	32				33	44	58	39	22	22	26	26
29	32	29	30		32	44	56	37	21	21	25	26
30	30	29		32	.....	44	58	35	21	21	25	25
31	31	.....		32	.....	39	.....	36	.....	21	25	.....

NOTE.—Discharge estimated because of faulty gage-height record Oct. 4–5, and Nov. 24 to Dec. 14, 1918, Jan. 10 to Feb. 10, June 1–7, 28–30, July 1–4, 28–31, Aug. 27–30, Nov. 24–28, and Dec. 28–31, 1919, and Jan. 1–20, 1920. Braced figures show mean discharge for periods indicated.

Monthly discharge of Box Elder Creek near Brigham, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	37	25	27.1	1,670
November	34	.....	29.5	1,760
December	.....	.....	24.6	1,510
January	.....	.....	22.9	1,410
February	46	.....	27.6	1,530
March	63	28	39.2	2,410
April	52	38	46.3	2,760
May	47	27	36.0	2,210
June	26	21	23.0	1,370
July	26	23	24.9	1,530
August	22	19	20.8	1,280
September	25	21	22.5	1,340
The year	63	19	28.7	20,800
1919–20.				
October	32	24	30.2	1,860
November	34	29	31.2	1,860
December	33	19	30.2	1,860
January	.....	.....	30.1	1,850
February	39	30	32.4	1,860
March	48	32	38.5	2,370
April	80	39	53.4	3,180
May	76	35	57.1	3,510
June	36	21	26.3	1,560
July	24	20	22.0	1,350
August	26	21	21.9	1,350
September	27	23	25.3	1,510
The year	80	19	33.2	24,100

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WEBER RIVER BASIN.

WEBER RIVER NEAR OAKLEY, UTAH.

LOCATION.—In NE. ¼ sec. 15, T. 1 S., R. 6 E., near mouth of canyon, 3 miles above Oakley, Summit County. South Fork of Weber River enters 2 miles above station, and Beaver or Kamas Creek 6 miles below.

DRAINAGE AREA.—163 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 22, 1904, to September 30, 1920.

GAGE.—Inclined staff on left bank about a quarter of a mile above the upper ditch diverting from Weber River. Read by John Franson.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders. One channel at all stages; steep and rough but apparently fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 7.0 feet on May 29 (discharge, 1,580 second-feet); minimum discharge less than 50 second-feet during January when stage-discharge relation was affected by ice.

Maximum stage recorded during year ending September 30, 1920, 7.8 feet on June 8 and 9 (discharge, 2,340 second-feet); minimum discharge less than 50 second-feet in December when stage-discharge relation was affected by ice.

1904–1920: Maximum stage recorded, 8.5 feet July 6, 1907, and June 5–7, 1909 (discharge, 4,010 second-feet); minimum stage, 4.0 feet for periods during February and March, 1908 (discharge, 46 second-feet).

ICE.—Stage-discharge relation seriously affected by ice every winter.

DIVERSIONS.—Above all important diversions.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent, except as affected by ice November 23, 1918, to March 12, 1919, and December 7, 1919, to March 30, 1920. Rating curve well defined between 75 and 2,000 second-feet. Gage read to half-tenths once a day except during periods of ice effect when it was read once a week. Daily discharge determined by applying daily gage height to rating table except for periods of ice effect for which it was estimated from current-meter measurements, temperature records, and observer's notes. Records good.

Discharge measurements of Weber River near Oakley, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Oct. 4	L. W. Jordan	4.40	121	May 5	W. E. Dickinson	4.92	282
1919.				27	do	7.00	1,560
Feb. 17	J. W. Bones	4.13	58	July 30	A. B. Purton	4.46	123
May 13	do	5.35	448	Sept. 8	do	4.26	86
June 11	A. B. Purton	5.55	513				
July 28	do	4.21	78				

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Daily discharge, in second-feet, of Weber River near Oakley, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	62	76					93	430	612	141	84	62
2	62	76					93	451	516	141	84	84
3	62	76					84	472	516	128	84	76
4	115	76					84	516	539	128	76	115
5	139	76					84	472	562	128	76	84
6	162	69					76	472	516	115	76	62
7	186	69				55	76	472	516	115	76	69
8	141	69					76	472	516	104	69	65
9	115	62			55		76	472	667	93	69	62
10	115	62					76	516	667	93	69	62
11	115	62					76	494	562	93	69	62
12	115	62					76	472	562	93	62	56
13	104	62				50	76	451	562	93	62	56
14	104	62				50	76	516	516	93	62	56
15	93	62				50	93	562	472	84	62	56
16	93	62	65	50		50	104	727	430	84	62	69
17	115	62			58	50	104	790	410	84	62	62
18	128	62				50	115	860	369	84	62	69
19	115	62				56	115	1,000	349	84	62	62
20	104	62				56	141	1,160	349	84	62	56
21	104	62				62	170	930	330	84	56	56
22	93	62				62	236	1,160	310	84	56	56
23	93				58	69	310	1,160	291	93	56	56
24	84					69	369	1,160	254	104	56	56
25	84					69	410	1,000	236	93	56	56
26	76	58				69	349	1,080	219	93	56	56
27	76					69	310	1,080	170	84	56	56
28	76					76	310	1,490	156	81	56	76
29	76				.....	76	310	1,580	156	84	56	141
30	76				.....	84	349	1,320	156	84	56	93
31	76	.....			.....	93	.....	790	.....	84	56	.....
1919–20.												
1	115	76	69			62	69	170	1,760	516	141	93
2	115	84	69		62	62	69	186	1,580	516	141	93
3	115	84	69			62	69	202	1,490	472	141	93
4	115	84	76		62		69	236	1,400	472	141	93
5	115	84	76				76	280	1,580	430	156	93
6	115	76	76			62	76	310	1,850	389	141	93
7	115	76					84	349	2,040	389	141	93
8	115	76	65	50			84	430	2,340	349	156	86
9	104	69					84	472	2,340	349	170	84
10	93	76				62	84	516	2,040	310	141	84
11	93	76					93	562	1,580	310	115	84
12	93	76					93	472	1,580	272	115	84
13	93	76					104	516	1,580	236	115	84
14	93	76					115	612	1,490	236	115	84
15	93	76					115	562	1,400	236	115	84
16	93	76					115	612	1,320	219	115	84
17	84	76			62	65	115	701	1,160	219	115	76
18	84	76					93	790	1,080	219	115	76
19	84	76					93	1,080	1,080	219	115	76
20	84	76	50				93	1,320	1,080	202	104	76
21	84	76		62			84	1,400	1,080	202	104	76
22	76	76					84	1,850	1,000	202	93	76
23	76	76					76	1,580	1,000	202	93	76
24	76	76				69	76	1,580	930	202	93	76
25	76	76					76	1,850	860	186	93	76
26	76	76					84	1,760	727	170	93	93
27	76	69				69	93	1,620	727	156	115	93
28	62	69		62			104	1,760	667	156	115	93
29	76	69					115	1,940	562	141	115	93
	76	69		62	.....		141	2,040	562	131	104	93
	69	.....			.....	69	.....	2,040	.....	141	104	.....

rge interpolated on account of lack of gage heights, Oct. 5, 6, Nov. 10, 17, 1918, Mar. 14, 7, 11, June 4, 29, July 30, Sept. 8, 21, Oct. 12, 26, Nov. 17–21, 30, 1919, May 17, June 20, 5, 1920. Stage-discharge relation affected by ice, Nov. 23, 1918, to Mar. 12, 1919, and Dec. 0, 1920. Braced figures show mean discharge for periods indicated.

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Monthly discharge of Weber River near Oakley, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	186	62	102	6,270
November	76	.....	64.0	3,810
December	.....	.....	65.0	4,000
January	.....	.....	50.0	3,070
February	.....	.....	56.3	3,130
March	93	50	60.3	3,710
April	410	76	164	9,760
May	1,580	430	791	48,600
June	667	156	416	24,800
July	141	81	97.7	6,010
August	84	56	64.7	3,980
September	141	56	68.3	4,060
The year	1,580	.....	167	121,000
1919-20.				
October	115	62	91.4	5,620
November	84	69	75.9	4,520
December	76	.....	55.8	3,430
January	.....	.....	56.2	3,460
February	.....	.....	62.0	3,570
March	.....	.....	65.1	4,000
April	141	69	90.9	5,410
May	2,040	170	961	59,100
June	2,340	562	1,330	79,100
July	516	131	273	16,800
August	170	93	120	7,380
September	93	76	85.3	5,080
The year	2,340	.....	272	197,000

WEBER RIVER AT DEVILS SLIDE, UTAH.

LOCATION.—In SW. ¼ sec. 19, T. 4 N., R. 4 E., 300 feet north of hotel and 500 feet downstream from highway bridge at Devils Slide, Morgan County. Lost Creek enters from right a quarter of a mile above station.

DRAINAGE AREA.—1,090 square miles (measured on topographic and U. S. Forest Service maps).

RECORDS AVAILABLE.—February 1, 1905, to September 30, 1920.

GAGE.—Vertical staff on left bank, installed September 21, 1915; read by A. E. Lucas.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and sand; shifts occasionally. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 4.6 feet at noon May 30 (discharge, 1,630 second-feet); minimum stage 1.88 feet September 3 (discharge, 31 second-feet).

Maximum stage during year ending September 30, 1920, 8.0 feet at 6 p. m. May 22 (discharge, 6,000 second-feet); minimum stage, 2.32 feet October 1, and January 15 (discharge, 105 second-feet).

1905-1920: Maximum stage recorded, 8.0 feet at 6 p. m., May 22, 1920 (discharge, 6,000 second-feet); minimum stage, 1.88 feet September 3, 1919 (discharge, 31 second-feet).

ICE.—Stage-discharge relation not seriously affected by ice.

DIVERSIONS.—A number of canals divert water above this station for irrigation and domestic use.

REGULATION.—Diversions for irrigation only.

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ACCURACY.—Stage-discharge relation below 2,000 second-feet changed during high water, the peak of which occurred on May 22, 1920; affected by ice December 6–31, 1918. Rating curves well defined below 4,000 second-feet and extended above. Gage read to hundredths once daily except June 15, 1919, and May 22–25, 1920. Maximum stage on May 22, 1920, determined later by measuring up to high-water mark on gage post from top graduation on gage. Daily discharge ascertained by applying daily gage reading to rating table. Discharge June 15, 1919, interpolated. Discharge December 6–31, 1918, and May 22–25, 1920, estimated by use of hydrograph. Records good.

Discharge measurements of Weber River at Devils Slide, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 4	L. W. Jordan	2.53	156	Sept. 17	Bones and Purton	2.22	78
1919.				1920.			
Feb. 18	J. W. Bones	2.45	153	May 5	W. E. Dickinson	4.45	1,480
May 14	do	3.65	743	28	do	6.34	3,060
June 11	A. B. Purton	3.29	526	July 2	Purton and Sanford	3.16	596
July 13	Purton and Bones	1.96	42.4	30	A. B. Purton	2.22	151
28	A. B. Purton	2.05	48.3	Sept. 8	do	2.30	193

Daily discharge, in second-feet, of Weber River at Devils Slide, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	153	247	216	102	133	146	695	1,010	1,050	47	58	34
2	153	247	212	99	130	153	615	1,090	859	44	67	31
3	159	243	235	113	127	156	540	1,100	723	44	159	31
4	166	239	227	124	124	173	470	1,190	668	44	72	45
5	173	239	231	133	124	173	470	1,140	558	42	58	60
6	184	227	235	113	121	153	875	1,000	577	40	51	60
7	315	231	306	133	130	166	415	909	628	44	51	60
8	251	235	394	107	130	143	358	859	654	43	51	62
9	231	231	275	110	133	143	315	828	642	43	52	69
10	339	231	201	116	140	133	315	987	589	41	52	63
11	280	227	162	130	146	113	325	828	540	38	51	63
12	263	224	194	133	153	166	329	738	534	38	51	6[illegible]
13	251	216	180	127	133	173	363	738	487	40	47	62
14	239	224	216	127	133	187	389	782	384	38	45	62
15	239	227	190	113	133	173	353	875	352	38	44	62
16	235	280	231	119	121	166	325	943	320	38	47	83
17	251	247	227	133	121	156	315	960	280	42	47	83
18	320	231	239	130	143	190	358	1,000	239	42	50	90
19	293	271	173	133	143	289	437	1,130	205	45	47	94
20	271	263	156	133	127	329	487	1,160	162	44	47	88
21	263	224	140	133	153	552	565	1,160	140	44	43	85
22	259	255	130	140	127	470	641	1,130	107	42	40	81
23	251	176	121	133	143	540	753	1,230	116	42	40	78
24	239	209	110	133	130	682	836	1,240	105	44	40	76
25	239	224	116	133	140	668	918	1,240	85	45	38	76
26	239	180		127	140	580	892	1,190	67	44	35	74
27	239	159		121	127	682	844	1,170	60	47	35	74
28	271	173	110	127	130	875	797	1,360	55	51	34	81
29	280	212		127	.....	797	868	1,580	52	55	34	94
30	263	231		133	.....	688	926	1,630	51	55	35	94
31	251	.....		130	.....	836	.....	1,440	.....	57	35	.....

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Daily discharge, in second-feet, of Weber River at Devils Slide, Utah, for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	105	231	231	140	159	187	194	1,050	3,250	665	165	194
2	153	239	239	127	176	255	231	1,280	2,840	595	165	194
3	216	271	224	130	194	267	194	1,180	2,310	517	194	186
4	209	271	187	133	166	235	190	1,330	2,170	453	190	179
5	194	267	212	146	159	209	251	1,450	2,170	408	205	179
6	166	251	216	153	162	194	354	1,550	2,370	365	216	190
7	162	251	216	133	173	153	358	1,790	2,460	323	186	194
8	159	247	194	146	194	166	528	2,140	2,500	300	186	186
9	156	209	133	133	173	231	918	2,500	2,500	274	205	186
10	156	247	140	133	146	311	1,410	2,740	2,400	232	232	190
11	159	255	159	127	133	280	836	2,800	2,130	194	216	186
12	159	231	201	137	127	201	1,000	2,390	1,950	186	205	224
13	159	209	159	127	159	263	978	2,680	1,890	162	205	186
14	166	205	159	130	143	267	875	3,080	1,840	136	190	168
15	190	224	159	105	166	239	960	2,880	1,700	136	172	151
16	180	235	133	127	166	166	1,100	2,860	1,610	136	168	151
17	173	247	146	143	159	231	797	3,120	1,770	145	165	154
18	166	251	140	140	156	194	709	3,480	1,420	133	165	151
19	180	251	133	143	198	166	499	3,760	1,330	133	201	142
20	187	255	133	133	187	194	589	4,000	1,280	186	182	139
21	194	239	143	133	166	271	459	4,160	1,220	136	176	136
22	194	231	166	133	201	499	426	5,500	1,200	127	168	136
23	187	231	159	143	315	389	426	5,500	1,160	127	158	172
24	176	227	159	133	231	280	410	4,900	1,070	158	158	220
25	212	212	162	146	198	255	415	4,500	973	179	151	232
26	212	224	162	146	153	293	437	4,060	860	179	176	224
27	220	176	143	159	146	247	482	3,740	788	154	179	209
28	224	153	127	156	212	224	622	3,610	776	145	257	197
29	239	166	121	156	198	239	797	3,610	751	158	232	186
30	243	201	133	153	.....	255	1,050	3,610	689	158	209	186
31	227	.....	159	153	.....	271	.....	3,580	.....	165	201	.....

Monthly discharge of Weber River at Devils Slide, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	339	153	244	15,000
November	280	159	227	13,500
December	394	.....	186	11,400
January	140	99	125	7,690
February	153	121	133	7,390
March	875	113	350	21,500
April	926	315	560	33,300
May	1,630	738	1,090	67,000
June	1,050	51	376	22,400
July	57	38	43.9	2,700
August	159	34	50.2	3,090
September	94	31	69.3	4,120
The year	1,630	31	289	209,000
1919-20.				
October	243	105	185	11,400
November	271	133	230	13,700
December	239	121	166	10,200
January	159	105	139	8,550
February	315	127	176	10,100
March	499	153	246	15,100
April	1,410	190	616	36,700
May	5,500	1,050	3,060	188,000
June	3,250	689	1,710	102,000
July	665	127	236	14,500
August	257	151	190	11,700
September	232	136	181	10,800
The year	5,500	105	596	433,000

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WEBER RIVER NEAR PLAIN CITY, UTAH.

LOCATION.—In SE. ¼ sec. 5, T. 6 N., R. 2 W., at county highway bridge 1 mile south of Plain City, Weber County, on road to Ogden, 1 mile below mouth of Four-mile Creek, 2 miles below Mill Creek, 6 miles below Ogden River, and 6 miles above point where Weber River empties into Great Salt Lake.

DRAINAGE AREA.—2,060 square miles (measured on topographic and U. S. Forest Service maps).

RECORDS AVAILABLE.—May 14, 1905, to September 30, 1920. Records were obtained at this point in 1904 by the State of Utah under the direction of the State engineer.

GAGE.—Chain gage on upstream side of highway bridge; installed November 12, 1914, at same datum as old gage. Gage used 1904 to November 11, 1914, was painted on upstream side of middle pier of bridge. Gage read by W. E. Davies.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading. Conditions fair.

CHANNEL AND CONTROL.—Bed composed of sand and mud. Shifting. One channel at all stages. Banks are high.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 11.8 feet, April 25 (discharge, 2,680 second-feet); river practically dry during periods in July, August, and September.

Maximum stage recorded during year ending September 30, 1920, 19.1 feet at noon May 23 (discharge, 7,100 second-feet); river practically dry during parts of July, August, and September.

1904–1920: Maximum discharge recorded, 7,580 second-feet June 6, 1909; river practically dry during latter part of each summer since 1915.

ICE.—Stage-discharge relation affected by ice each winter.

DIVERSIONS.—In the summer practically the entire flow of Weber River above station is diverted for irrigation.

REGULATION.—Flow affected by diversions.

ACCURACY.—Stage-discharge relation permanent, except as affected by ice December 23, 1918, to January 20, 1919, and December, 1919, to February 10, 1920. Rating curves well defined. Gage read to half-tenths once a day, with occasional extra readings during high water. Gage not read October 14, 1919, to January 30, 1920. Daily discharge ascertained by applying daily gage height to rating table, except as follows: Discharge for periods of ice effect estimated from meter measurements, observer's notes, and temperature records. Discharge June 23 to September 30, 1919, and July 11 to August 14, August 18–25, and September 15–18, 1920, estimated from observer's notes because stage was so low that gage could not be read. Discharge interpolated because of no gage-height record November 17–21, 1918, June 5, 1919, and February 23, March 21, and May 6, 1920. Discharge not determined October 14, 1919, to January 30, 1920.

Discharge measurements of Weber River near Plain City, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
1918.				1919.			
Oct. 5	L. W. Jordan	3.11	166	Oct. 13	J. W. Bones	3.56	240
1919.				1920.			
Feb. 19	J. W. Bones	3.86	300	Jan. 31	A. B. Purton	a 4.84	451
May 12	do	8.13	1,460	May 3	W. E. Dickinson	13.04	3,130

a Stage-discharge relation affected by ice.

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Daily discharge, in second-feet, of Weber River near Plain City, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	177	346	336		297	316	2,400	2,610	1,220			
2	177	336	346		297	336	1,990	2,500	812			
3	177	336	346		297	368	1,930	2,440	703			
4	177	336	357		288	378	1,760	2,300	623			
5	170	336	357		297	368	1,670	2,060	534			
6	278	346	357		297	357	1,540	1,960	446			
7	297	346	368		297	357	1,320	1,600	316			
8	297	357	400	230	297	357	1,100	1,380	278			
9	316	357	520		306	357	1,100	1,350	278			
10	378	357	470		326	357	1,040	1,600	162			
11	378	346	400		336	357	1,100	1,570	134			
12	357	336	357		336	357	1,130	1,470	96			
13	316	336	336		346	400	1,250	1,380	51			
14	297	336	336		336	423	1,320	1,320	41			
15	297	357	368		316	423	1,190	1,220	41			
16	260	400	368		297	423	1,130	1,280	41	0.2	0.2	0.2
17	278	398	368		297	423	1,100	1,160	41			
18	316	396	368	350	297	446	1,130	1,070	36			
19	378	394	336		297	470	1,380	1,040	32			
20	357	392	326		306	730	1,630	1,010	28			
21	357	390	260	357	326	868	1,730	952	24			
22	336	389	208	336	316	1,010	1,830	938	17			
23	336	336		316	316	1,160	2,060	840				
24	326	336		316	326	1,280	2,470	840				
25	316	336		316	316	1,570	2,680	840				
26	336	316	200	306	316	1,670	2,500	784	.5			
27	336	316		297	316	1,760	2,370	784				
28	336	336		260	316	1,830	2,260	730				
29	326	336		278	.....	1,990	2,330	730				
30	336	336		297	.....	2,280	2,470	1,380				
31	336	.....		297	.....	2,300	.....	1,600	.....			.....
1919-20.												
1	148	.....	.....	.....		502	952	3,990	5,140	356	0	248
2	177	.....	.....	.....		545	896	3,320	4,330	283	0	214
3	260	.....	.....	.....		868	874	3,210	3,760	263	0	157
4	297	.....	.....	.....		730	812	3,140	3,080	182	0	132
5	316	.....	.....	.....		662	882	3,350	2,750	127	0	73
6	316	.....	.....	.....	475	602	1,540	3,680	2,860	80	0	83
7	297	.....	.....	.....		520	1,400	4,020	2,750	49	1	99
8	278	.....	.....	.....		512	1,930	4,280	2,740	17	1	73
9	278	.....	.....	.....		545	2,330	4,780	2,720	10	0	55
10	260	.....	.....	.....		636	2,780	5,370	2,650	2	0	29
11	242	.....	.....	.....	423	757	2,620	5,780	2,540	0	0	21
12	225	.....	.....	.....	423	690	2,660	5,940	2,220	0	0	15
13	247	.....	.....	.....	412	676	2,780	5,530	2,090	0	0	6
14	.....	.....	.....	.....	446	896	2,760	5,610	2,030	0	0	1
15	.....	.....	.....	.....	470	784	3,550	6,030	1,930	0	3	0
16	.....	.....	.....	.....	423	716	3,850	6,030	1,670	0	1	0
17	.....	.....	.....	.....	434	602	3,620	6,110	1,560	0	1	0
18	.....	.....	.....	.....	423	676	2,500	6,150	1,450	1	0	0
19	.....	.....	.....	.....	423	605	2,130	6,370	1,340	0	0	3
20	.....	.....	.....	.....	500	584	2,060	6,350	1,190	0	0	4
21	.....	.....	.....	.....	532	705	1,990	6,420	1,060	0	0	3
22	.....	.....	.....	.....	558	826	1,900	6,570	980	0	0	3
23	.....	.....	.....	.....	646	1,100	1,730	7,000	935	0	0	61
24	.....	.....	.....	.....	735	952	1,600	6,950	870	0	0	195
25	.....	.....	.....	.....	681	888	1,570	6,790	772	0	0	287
26	.....	.....	.....	.....	545	924	1,580	6,590	697	0	2	503
27	.....	.....	.....	.....	470	966	1,630	6,320	633	0	12	434
28	.....	.....	.....	.....	495	868	1,980	5,960	527	0	44	385
29	.....	.....	.....	.....	520	874	2,280	5,680	480	0	289	356
30	.....	.....	.....	.....	.....	854	2,750	5,720	434	0	283	324
31	.....	.....	.....	451	.....	981	.....	5,310	.....	0	283	.....

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Monthly discharge of Weber River near Plain City, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	378	170	302	18,600
November	400	316	357	20,900
December	520	.....	313	19,200
January	.....	.....	277	17,000
February	346	288	311	17,300
March	2,300	316	828	50,900
April	2,680	1,040	1,700	101,000
May	2,610	730	1,380	84,800
June	1,220	.....	199	11,800
July	.....	.....	.2	12
August	.....	.....	.2	12
September	.....	.....	.2	12
The year	2,680	.....	472	342,000
1919–20.				
October 1–13	316	148	257	6,610
February	735	412	493	28,400
March	1,100	502	743	45,700
April	3,850	812	2,060	123,000
May	7,000	3,000	5,400	332,000
June	5,140	434	1,940	115,000
July	356	0	44.2	2,720
August	289	0	29.7	1,830
September	503	0	125	7,440
The period	.....	.....	.....	656,000

JORDAN RIVER BASIN.

JORDAN RIVER NEAR LEHI, UTAH.

LOCATION.—In sec. 25, T. 5 S., R. 1 W., 800 feet below pump house at outlet of Utah Lake and 4 miles southwest of Lehi, Utah County.

DRAINAGE AREA.—2,570 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 30 to December 31, 1904, and July 22, 1913, to September 30, 1920.

GAGE.—Stevens 8-day water-stage recorder with concrete stilling well and inside vertical staff gage, on right bank about 25 feet above bridge since May 16, 1920; inspected by W. A. Knight. From January 6, 1914, until recorder was installed in 1920, gage was vertical staff in stilling well at same site and datum.

DISCHARGE MEASUREMENTS.—Made from cable about 400 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of clay and hardpan. Banks clean and low; not subject to overflow. One channel at the gage. Area slightly constricted below by highway bridge.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 5.57 feet June 18, 20, and 23 (discharge, 820 second-feet); river dry August 14, 15, and September 2 because of dam placed in lake outlet to permit repairing of cut-off wall under pump house.

Maximum daily mean stage reported during the year ending September 30, 1920, 5.69 feet June 23 (discharge, 812 second-feet); river dry October 16 to May 15 because of dam placed in lake outlet incident to construction of new pumping plant.

1901, 1913–1920: Maximum stage recorded, 6.30 feet June 25, 1917 (discharge, 922 second-feet). Minimum stage occurred at 6 p. m. December 15, 1915, when river was dry owing to a strong north wind which blew the water in the lake away from the outlet gates. River was dry also on August 14–15, and September 2, 1919, because of dam placed in lake outlet to permit repairing of cut-off wall under pump house, and October 16, 1919, to May 15, 1920, because of dam placed in lake outlet incident to construction of new pumping plant.

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ICE.—Stage-discharge relation seldom affected by ice.

DIVERSIONS.—None from Jordan River above the station. In the Narrows about 6 miles north (several miles farther by river) a number of large canals divert for irrigation in Salt Lake Valley and for use by the smelters, etc., in the vicinity of Garfield.

REGULATION.—During the irrigation season when the natural flow from Utah Lake is inadequate for the demands below, water is pumped from the lake into Jordan River. A pumping plant with a capacity of about 1,500 second-feet is at outlet of lake, 800 feet above gage, and is owned and operated by various canal companies interested in the stream. This 1,500 second-feet capacity includes four 200-second-feet units installed during the winter of 1919–20.

ACCURACY.—Stage-discharge relation changed slightly about June 22, 1920. Rating curves well defined. Gage read once a day to hundredths October 1, 1918, to October 15, 1919, except as indicated in footnote to daily-discharge table. Operation of water-stage recorder satisfactory May 16 to September 30, 1920. Daily discharge ascertained by applying daily mean gage height to rating table except for days when gage was not read. For these days, discharge was interpolated. River was dammed at lake outlet from 7 a. m. August 13 to 3 p m. August 16, and from 7 a. m. September 1 to 9 p. m. September 3, 1919, to permit repairing of cut-off wall under pump house. River was also dammed at lake outlet from 4 p. m. October 14, 1919, to noon May 16, 1920. Records good.

COOPERATION.—Records of daily mean gage height furnished by W. A. Knight, water commissioner.

Discharge measurements of Jordan River near Lehi, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 3	Jordan and Jacob.....	2.74	200	Aug. 28	W. E. Dickinson.....	4.56	567
1919.				1920.			
Feb. 20	L. W. Jordan.....	3.55	349	May 17	W. E. Dickinson.....	3.32	302
June 4	J. W. Bones.....	4.95	603	June 16	R. R. Rowe.....	5.32	757
24	W. E. Dickinson.....	5.52	807	Sept. 12	A. B. Purton.....	5.00	642

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Daily discharge, in second-feet, of Jordan River near Lehi, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	195	155	195	179	203	383	453	471	727	799	684	142
2	195	155	196	176	212	385	455	606	625	802	669	0
3	191	154	198	165	220	390	454	620	649	799	664	70
4	185	156	200	164	225	390	453	635	666	802	662	561
5	185	155	202	164	231	392	453	662	669	797	656	601
6	185	155	208	166	231	398	453	712	669	786	637	642
7	185	158	202	166	234	394	442	722	664	802	618	635
8	185	159	205	168	241	396	460	724	666	781	603	623
9	185	159	207	168	249	394	457	714	716	776	594	618
10	187	161	210	170	258	400	462	722	747	773	589	613
11	188	159	212	170	250	402	453	722	747	773	577	606
12	187	162	212	170	267	402	464	722	747	766	462	611
13	188	162	212	171	270	404	475	656	742	773	122	599
14	187	164	215	171	276	421	475	672	742	763	0	587
15	185	164	217	171	279	406	484	669	742	763	0	591
16	185	166	218	171	281	413	477	669	740	760	137	591
17	185	166	218	171	285	413	486	674	789	753	540	582
18	185	166	222	171	276	413	482	674	820	737	620	580
19	185	166	225	154	290	413	486	702	815	742	625	577
20	155	166	227	138	294	413	410	722	820	740	625	566
21	149	166	231	172	302	413	477	724	815	737	632	434
22	154	166	236	176	308	413	479	724	812	750	627	494
23	154	170	241	185	313	421	486	722	820	745	623	545
24	152	172	245	198	321	410	490	727	818	724	618	542
25	154	183	256	195	333	427	488	724	815	737	601	545
26	154	183	247	200	337	434	520	729	812	742	599	545
27	154	183	249	203	343	442	488	747	802	737	589	568
28	154	195	247	207	347	440	484	760	802	727	582	549
29	154	195	172	207	.....	446	499	760	802	734	554	488
30	154	193	172	217	.....	449	477	773	802	734	517	464
31	155	.....	176	213	.....	451	.....	750	.....	712	510	.....
1919–20.												
1	453	.....	.....	.....	.....	.....	.....	.....	792	808	762	654
2									784	802	762	652
3									773	802	762	652
4									768	802	760	649
5	70	.....	.....	.....	.....	.....	.....	.....	781	805	760	647
6									784	805	780	652
7									781	802	782	649
8	67	.....	.....	.....	.....	.....	.....	.....	779	795	765	654
9	66	.....	.....	.....	.....	.....	.....	.....	776	792	765	649
10	69	.....	.....	.....	.....	.....	.....	.....	773	792	775	654
11	70	.....	.....	.....	.....	.....	.....	.....	771	802	778	649
12	70	.....	.....	.....	.....	.....	.....	.....	768	810	775	649
13	70	.....	.....	.....	.....	.....	.....	.....	768	800	775	649
14	70	.....	.....	.....	.....	.....	.....	.....	766	785	772	644
15	24	.....	.....	.....	.....	.....	.....	0	763	780	770	642
16	0	.....	.....	.....	.....	.....	.....	155	760	762	765	642
17	.....	.....	.....	.....	.....	.....	.....	310	758	785	768	640
18	.....	.....	.....	.....	.....	.....	.....	310	755	782	768	635
19	.....	.....	.....	.....	.....	.....	.....	540	753	782	765	632
20	.....	.....	.....	.....	.....	.....	.....	554	750	780	760	571
21	.....	.....	.....	.....	.....	.....	.....	563	747	778	762	560
22	.....	.....	.....	.....	.....	.....	.....	591	785	782	760	560
23	.....	.....	.....	.....	.....	.....	.....	599	812	780	758	560
24	.....	.....	.....	.....	.....	.....	.....	601	752	778	755	514
25	.....	.....	.....	.....	.....	.....	.....	724	730	778	748	489
26	.....	.....	.....	.....	.....	.....	.....	802	718	775	752	360
27	.....	.....	.....	.....	.....	.....	.....	789	712	772	715	280
28	.....	.....	.....	.....	.....	.....	.....	789	775	772	664	278
29	.....	.....	.....	.....	.....	.....	.....	793	810	770	661	276
30	.....	.....	.....	.....	.....	.....	.....	799	810	768	661	271
31	.....	.....	.....	.....	.....	.....	.....	810	.....	765	656	.....

NOTE.—Gage not read, and discharge interpolated Jan. 19, Feb. 2, Mar. 17–19, 21, Apr. 1, 3, 5, May 3, Sept. 13, 18, and Oct. 11, 1919. Discharge Oct. 2–7, 1919, estimated from observer's notes, because gage was not read. No flow Oct. 16, 1919, to May 15, 1920.

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Monthly discharge of Jordan River near Lehi, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	195	149	174	10,700
November	195	154	167	9,940
December	256	172	215	13,200
January	217	138	178	10,900
February	347	203	274	15,200
March	451	383	412	25,300
April	520	410	471	28,000
May	773	471	697	42,900
June	820	625	753	44,800
July	802	712	760	46,700
August	684	0	533	32,800
September	642	0	519	30,900
The year	820	0	430	311,000
1919-20.				
October	453	0	44.5	2,740
May	810	0	314	19,300
June	812	712	768	45,700
July	810	762	787	48,400
August	782	656	750	46,100
September	654	271	566	33,700
The year	812	0	270	196,000

SPANISH FORK AT THISTLE, UTAH.

LOCATION.—In SW. ¼ SW. ¼ sec. 28, T. 9 S., R. 4 E., in town of Thistle, Utah County 800 feet below point where Soldier Fork and Thistle Creek unite to form Spanish Fork, 3 miles above confluence with Diamond Fork.

DRAINAGE AREA.—490 square miles (measured on topographic map).

RECORDS AVAILABLE.—December 3, 1907, to September 30, 1920.

GAGE.—Inclined staff on right bank 10 feet below cable; installed May 4, 1915; read by Mrs. Effie Gordon.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and sand. One channel at all stages. Left bank low and subject to overflow; right bank high and partly wooded. Channel straight for 100 feet above and 600 feet below gage. Control is a gravel bar about 30 feet below gage; shifting.

ICE.—Stage-discharge relation affected by ice for short periods.

DIVERSIONS.—No important diversions above the station.

REGULATION.—None.

COOPERATION.—Records since January 1, 1911, furnished by United States Reclamation Service.

Discharge measurements of Spanish Fork at Thistle, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Apr. 22	Smith and Sorenson	5.50	202	May 12	T. R. Smith	6.05	466
May 17	do	5.60	236	June 7	Smith and Borg	6.05	294
July 14	T. R. Smith	4.66	34.4	19	do	5.55	155
Sept. 16	do	4.60	37.1	July 1	do	5.36	107
1920.				Aug. 18	do	5.05	48.0
Apr. 4	T. R. Smith	5.02	122	Sept. 13	do	5.17	51
May 1	do	5.64	301				

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Daily discharge, in second-feet, of Spanish Fork at Thistle, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.											
1	40	52	52	.....	.....	145	293	104	45	43	37
2	40	52	52	.....	.....	144	305	100	47	42	37
3	40	52	52	.....	.....	143	320	100	45	42	37
4	52	52	52	.....	.....	142	334	100	45	45	32
5	52	52	52	.....	.....	142	352	96	47	42	31
6	52	52	52	.....	.....	142	334	82	47	42	33
7	52	52	52	.....	.....	134	300	82	45	42	32
8	52	52	52	.....	.....	111	283	82	45	43	32
9	52	52	52	.....	.....	100	283	79	42	37	32
10	52	52	52	.....	.....	104	266	74	39	37	32
11	52	52	52	.....	.....	111	260	73	39	34	32
12	52	52	52	.....	.....	122	240	68	40	31	31
13	52	52	52	.....	.....	124	240	67	40	31	31
14	52	52	52	.....	.....	122	240	66	42	30	31
15	52	52	52	.....	.....	118	250	65	42	30	31
16	52	40	52	.....	.....	111	250	63	40	30	37
17	52	40	52	.....	.....	115	234	61	40	30	32
18	52	40	52	.....	.....	127	202	61	42	31	32
19	52	52	52	.....	.....	147	188	61	40	31	32
20	52	52	52	.....	.....	218	174	60	40	32	33
21	52	52	52	.....	.....	218	160	58	39	31	34
22	52	52	52	.....	.....	218	147	54	40	31	36
23	52	52	52	.....	.....	234	134	53	40	31	37
24	52	52	52	.....	.....	234	127	52	42	31	37
25	52	52	52	.....	.....	260	122	51	40	31	36
26	52	52	52	.....	.....	266	117	47	39	31	36
27	52	52	52	.....	.....	240	111	45	39	32	36
28	52	52	52	.....	.....	240	104	47	40	32	30
29	52	52	52	.....	.....	250	111	47	40	31	51
30	52	52	52	.....	.....	266	111	45	40	30	38
31	52	.....	52	.....	.....	.....	111	.....	40	30	.....
1919-20.											
1	44	35	38	.....	54	45	319	453	109	50	84
2	38	37	37	.....	147	56	283	406	102	44	82
3	39	40	36	43	89	54	319	375	98	78	80
4	39	40	41	43	61	56	358	347	94	69	80
5	38	40	40	43	56	60	358	319	92	64	89
6	37	39	41	41	61	91	319	315	88	69	88
7	37	38	.....	40	61	93	489	300	88	69	78
8	37	43	.....	40	54	109	550	245	84	76	78
9	37	37	.....	40	61	109	587	227	82	76	78
10	37	32	.....	38	60	114	639	218	82	80	78
11	37	42	.....	35	64	99	537	201	73	69	78
12	37	38	.....	34	51	97	443	201	69	64	78
13	37	35	.....	40	57	105	513	188	67	62	74
14	43	33	.....	30	70	109	489	190	64	62	74
15	40	32	.....	31	48	147	421	185	64	62	73
16	39	39	.....	32	45	200	689	177	67	62	71
17	38	41	.....	33	54	192	721	172	64	60	69
18	37	39	.....	35	49	187	755	172	74	60	74
19	38	39	.....	40	51	120	783	165	67	58	71
20	38	39	.....	45	54	131	870	155	60	116	69
21	37	39	.....	44	69	135	899	145	54	82	67
22	38	37	.....	45	72	103	876	138	50	78	67
23	38	37	.....	48	69	109	915	138	60	73	80
24	38	37	.....	49	64	99	1,010	136	69	69	74
25	41	37	.....	48	61	108	815	131	62	67	78
26	43	37	.....	47	64	105	715	127	58	131	78
27	41	37	.....	43	59	120	640	129	55	109	76
28	34	36	.....	49	57	154	607	120	52	94	76
29	40	33	.....	49	56	171	564	127	50	92	76
30	39	39	.....	.....	57	206	532	118	50	88	74
31	37	.....	.....	.....	60	.....	521	.....	52	86	.....

NOTE.—No records during winter.

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Monthly discharge of Spanish Fork at Thistle, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	52	40	51	3,130
November	52	40	49	3,020
December	52	52	52	3,200
April	266	100	168	10,000
May	352	104	216	13,300
June	104	45	68	4,050
July	47	39	42	2,560
August	45	30	34	2,110
September	51	30	34	2,040
1919-20.				
October	44	34	38.5	2,370
November	43	32	37.6	2,240
December 1-6	41	36	38.8	462
February 3-29	49	30	40.9	2,190
March	147	45	62.4	3,840
April	206	45	116	6,900
May	1,010	283	596	36,600
June	453	118	211	12,600
July	109	50	71.0	4,370
August	131	44	74.8	4,600
September	88	67	76.0	4,520

NOTE.—Monthly discharge computed by U. S. Geol. Survey.

SPANISH FORK AT LAKE SHORE, UTAH.

LOCATION.—In NE. ¼ sec. 15, T. 8 S., R. 2 E., 1 mile east of Lake Shore, Utah County, 3 miles above mouth, and 3 miles northwest of Spanish Fork; below all tributaries and diversions.

DRAINAGE AREA.—700 square miles (measured on topographic map).

RECORDS AVAILABLE.—December 10, 1903, to July 10, 1907; March 10, 1909, to September 30, 1920.

GAGE.—Inclined staff with vertical low-water extension, on right bank about half a mile below highway bridge; installed March 10, 1909; read by George L. Larson.

DISCHARGE MEASUREMENTS.—Made from cable at present gage or by wading.

CHANNEL AND CONTROL.—Bed soft; fairly permanent. One channel at all stages; banks of earth, high and clean.

ICE.—Stage-discharge relation slightly affected for short periods.

DIVERSIONS.—Entire flow is diverted above station during latter part of irrigation season; only waste and return waters pass the gage at that time.

REGULATION.—Natural flow affected by irrigation diversions.

COOPERATION.—Since January 1, 1911, records have been furnished by the United States Reclamation Service.

Discharge measurements of Spanish Fork at Lake Shore, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Mar. 28	Gerner and Smith	5.93	210	Apr. 26	T. R. Smith	6.30	217
Apr. 1	do	6.28	246	May 8	do	11.74	605
25	Smith and Sorenson	6.56	263	26	Smith and Borg	13.72	861
May 5	do	4.73	95	29	do	11.43	643
11	T. R. Smith	3.65	42.9				

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Daily discharge, in second-feet, of Spanish Fork at Lake Shore, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	2	86	61	87	94	87	264	129	2	0	46	26
2	2	86	61	87	94	87	306	59	0	0	35	39
3	3	86	66	87	94	87	272	59	0	40	30	7
4	3	86	72	80	94	87	272	94	0	87	26	0
5	6	86	72	73	87	87	264	115	0	87	13	0
6	11	86	72	59	87	80	248	122	0	0	0	0
7	15	86	72	59	94	87	240	80	0	0	0	0
8	19	86	79	59	94	94	232	19	0	0	0	0
9	23	86	86	59	87	101	240	19	0	0	19	0
10	19	79	79	66	87	115	224	22	0	0	5	0
11	15	79	72	80	94	122	232	46	0	0	46	0
12	23	86	61	87	94	136	256	19	0	46	0	0
13	32	86	56	87	87	129	232	8	0	46	0	0
14	41	79	61	87	87	122	224	3	0	157	0	0
15	51	79	66	87	87	115	216	3	0	108	0	0
16	66	79	72	94	87	101	208	3	0	59	0	0
17	72	79	72	101	87	87	216	3	0	19	0	0
18	72	79	72	101	87	94	232	3	0	3	0	0
19	72	72	79	101	94	101	272	3	0	73	0	0
20	72	72	86	101	101	101	280	3	0	59	0	0
21	72	72	79	108	101	101	327	2	0	52	0	40
22	66	72	72	115	94	108	317	2	0	19	0	129
23	61	66	72	115	87	115	281	2	0	3	0	19
24	61	61	66	115	73	115	290	2	0	3	0	2
25	61	61	61	115	80	171	299	2	0	3	0	2
26	66	66	61	108	87	232	281	2	0	13	0	2
27	79	66	61	101	87	256	290	2	0	13	0	73
28	86	61	61	94	87	281	281	2	0	13	0	87
29	86	61	61	94	.....	281	300	5	0	16	0	73
30	92	61	61	94	.....	272	164	8	0	16	0	59
31	92	.....	61	94	.....	264	.....	5	.....	30	0	.....
1919-20.												
1	46	101	108	.....	.....	.....	.....	632	430	7	2	7
2	59	101	101	.....	.....	.....	.....	669	334	7	2	7
3	66	101	101	.....	.....	.....	.....	655	280	7	214	10
4	66	101	108	.....	.....	.....	.....	650	229	4	2	7
5	66	101	115	.....	.....	.....	.....	577	147	4	7	2
6	66	101	122	.....	.....	.....	.....	556	41	4	2	10
7	66	108	.....	.....	.....	.....	.....	613	31	4	2	2
8	66	108	.....	.....	.....	.....	.....	669	4	4	10	2
9	66	101	.....	.....	.....	.....	.....	726	4	4	10	2
10	66	94	.....	.....	.....	.....	.....	803	4	4	53	2
11	66	87	.....	.....	.....	.....	.....	755	4	2	40	2
12	66	87	.....	.....	.....	.....	.....	697	4	2	28	2
13	66	87	.....	.....	.....	.....	.....	755	10	2	10	2
14	59	94	.....	.....	.....	.....	.....	752	4	2	2	2
15	59	101	.....	.....	.....	.....	.....	697	4	2	2	2
16	59	101	.....	.....	.....	.....	.....	732	4	2	1	2
17	66	108	.....	.....	.....	.....	.....	823	4	2	1	2
18	66	101	.....	.....	.....	.....	.....	862	7	2	1	2
19	66	101	.....	.....	.....	.....	.....	877	4	2	22	2
20	59	108	.....	.....	.....	.....	.....	933	4	2	222	2
21	59	108	.....	.....	.....	.....	.....	902	4	2	47	2
22	66	108	.....	.....	.....	.....	.....	943	4	2	10	2
23	66	108	.....	.....	.....	.....	.....	1,080	4	2	6	16
24	66	108	.....	.....	.....	.....	.....	1,030	4	40	4	39
25	73	101	.....	.....	.....	.....	.....	953	4	4	2	124
26	87	94	.....	.....	.....	.....	.....	902	4	2	71	34
27	94	94	.....	.....	.....	.....	.....	818	4	2	10	180
28	87	94	.....	.....	.....	.....	.....	726	7	2	40	134
29	87	101	.....	.....	.....	.....	.....	669	50	2	10	121
30	94	101	.....	.....	.....	.....	.....	623	7	2	10	115
31	101	.....	.....	.....	.....	.....	.....	583	.....	2	7	.....

NOTE.—No records furnished for period in which no discharge is given.

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Monthly discharge of Spanish Fork at Lake Shore, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	92	2	46.5	2,860
November	86	61	76.3	4,540
December	86	56	68.8	4,230
January	115	59	90.2	5,550
February	101	73	89.8	4,990
March	281	80	136	8,360
April	327	164	256	15,200
May	129	2	27.3	1,680
June	2	0	.1	4
July	157	0	31.1	1,910
August	46	0	7.1	437
September	129	0	20.0	1,190
The year	327	0	70.4	51,000
1919-20.				
October	101	46	69.2	4,250
November	108	87	100	5,950
December 1-6	122	101	109	1,300
May	1,030	556	762	46,900
June	430	4	54.8	3,260
July	40	2	4.2	258
August	222	1	27.4	1,680
September	180	2	30.6	1,820

NOTE.—Monthly discharge computed by U. S. Geol. Survey.

PROVO RIVER AT FORKS, UTAH.

LOCATION.—In sec. 26, T. 5 S., R. 3 E., at Vivian Park summer resort, just above Forks, Utah County, 1 mile below mouth of North Fork of Provo River, which enters on right, and 400 feet above South Fork, which enters on left, 1 mile above Utah Power & Light Co.'s diversion dam, and 12 miles up Provo Canyon on highway and railroad from Provo to Heber.

DRAINAGE AREA.—600 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 17, 1911, to September 30, 1920. Records have been obtained at various points below the mouth of South Fork since 1890.

GAGE.—Vertical staff on right bank, 16 feet above steel bridge; installed July 21, 1920; read by J. F. Carter. From October 5, 1915, to July 20. 1920, staff gage on right bank half a mile upstream was used.

DISCHARGE MEASUREMENTS.—Made by wading or from steel bridge.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; fairly permanent. Banks fairly high and not subject to overflow; one channel at all stages. Control is gravel riffle. Point of zero flow on October 2, 1920 at about 0.8 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 3.00 feet at 7 p. m. May 23 (discharge, 1,240 second-feet); minimum stage, 0.06 foot at 8 a. m. on August 1 and 8 (discharge, 126 second-feet).

Maximum stage recorded during year ending September 30, 1920, 4.90 feet on May 22 (discharge by meter measurement, 2,300 second-feet); minimum stage 0.30 foot on January 8 (discharge, 202 second-feet).

1911-1920: Maximum discharge, 2,450 second-feet June 19, 1917; minimum stage recorded, 0.06 foot on August 1 and 8, 1919 (discharge, 126 second-feet).

ICE.—Occurs at this station for short periods only.

DIVERSIONS.—Station is below diversions for irrigation in Heber Valley and above those in the vicinity of Provo.

REGULATION.—A number of small lakes at the headwaters have been utilitized as storage reservoirs and flow is regulated to slight extent.

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ACCURACY.—Stage-discharge relation changed each winter during period of backwater from ice, and on July 21, 1920, when station was moved half a mile downstream; affected by ice January 1–14, November 28, and December 14–23, 1919, and January 9, 11, and 12, 1920. Rating curves well defined. Staff gage read once a day to hundredths. Daily discharge ascertained by applying daily gage height to rating table, except for periods of ice effect. For these periods discharge is estimated from current-meter measurements, gage heights, and temperature records. Records good.

COOPERATION.—Fifteen discharge measurements were furnished by Utah Power & Light Co., and three by T. F. Wentz, water commissioner.

Discharge measurements of Provo River at Forks, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Oct. 3	L. W. Jordan	0.56	231	Jan. 21	A. B. Purton	0.45	228
				Feb. 3	R. P. Flagel	.65	266
1919.				Mar. 11	do	.78	288
Feb. 19	do	.42	216	Apr. 28	do	1.20	419
Apr. 1	A. B. Purton	1.58	581	May 22	do	4.90	2,300
10	L. C. Monson [a]	.91	328	June 9	do	3.85	1,610
May 7	do	1.92	700	July 1	do	.96	339
June 4	J. W. Bones	1.26	451	21	Flagel and Stoner	[c] 2.22	256
21	H. L. Stoner [a]	.55	248	Aug. 12	Thorum and Stoner [a]	2.20	233
July 14	do	.30	183	20	T. F. Wentz [d]	2.27	252
22	A. B. Purton	.24	169	25	do	2.23	227
Aug. 29	W. E. Dickinson	.07	128	Sept. 1	Flagel and Stoner	2.26	236
Sept. 3	Flagel and Stoner	.17	143	7	T. F. Wentz	2.24	231
Dec. 18	R. P. Flagel [a]	[b] .70	243				

[a] Engineers for Utah Power & Light Co.
[b] Stage-discharge relation affected by ice.
[c] Reading on new gage at Vivian Park bridge; upper gage read 0.63 foot.
[d] Water commissioner.

Daily discharge, in second-feet, of Provo River at Forks, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	202	281	281		197	247	603	730	730	202	126	135
2	228	281	267		197	250	588	833	603	202	135	179
3	228	281	274		205	263	536	824	558	197	135	164
4	264	281	274		205	226	487	824	463	194	138	197
5	258	267	274		205	250	480	824	430	194	135	174
6	291	267	274	175	205	231	473	874	396	187	128	162
7	271	267	281		215	231	418	705	396	174	130	179
8	277	261	392		207	231	402	634	371	179	126	176
9	281	248	340		205	236	365	573	353	179	135	166
10	281	248	315		220	231	347	603	341	174	135	164
11	271	248	261		231	200	353	514	330	174	135	164
12	264	254	241	169	236	228	371	466	301	169	130	166
13	261	254	251	190	231	226	396	460	258	174	130	159
14	248	254	248		226	241	430	507	231	174	135	159
15	248	281	284	192	223	236	365	580	231	179	135	154
16	248	315	291	200	226	236	335	649	218	179	130	169
17	271	281	288	205	226	236	344	705	213	179	130	169
18	281	261	274	215	226	241	402	755	210	179	135	174
19	281	277	258	213	215	290	443	856	241	179	142	176
20	274	294	248	215	213	341	476	860	241	176	135	176
21	288	294	244	215	226	430	497	915	241	169	135	169
22	271	258	235	215	215	424	558	915	241	166	135	169
23	271	254	212	215	226	558	622	1,110	241	169	135	169
24	281	244	197	210	226	657	681	1,080	241	169	135	169
25	281	258	219	213	231	610	746	1,010	241	176	130	169
26	281	248	203	202	226	565	755	869	233	176	133	169
27	274	248	209	194	220	550	713	851	220	164	133	164
28	312	248	215	182	215	653	638	869	215	159	133	263
29	298	281	228	184	.....	634	626	962	213	145	130	205
30	281	288	228	187	.....	614	681	1,080	200	135	133	200
31	281	.....	190	187	.....	634	.....	943	.....	135	130	.....

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Daily discharge, in second-feet, of Provo River at Forks, Utah, for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	215	301	307	229	245	287	294	591	2,090	342	232	235
2	205	318	307	229	257	453	289	651	1,750	320	232	235
3	220	312	296	231	257	573	285	682	1,490	309	245	230
4	226	298	290	231	262	504	294	651	1,290	289	232	225
5	247	304	307	238	255	299	289	706	1,270	275	242	225
6	233	312	307	242	249	289	371	754	1,320	271	238	225
7	231	296	307	236	249	268	389	838	1,400	262	230	230
8	231	330	307	202	257	275	541	971	1,490	253	230	235
9	231	312	220	205	253	309	584	1,040	1,570	253	238	235
10	231	307	252	211	242	325	606	1,130	1,550	253	238	230
11	289	318	285	212	242	302	493	1,140	1,350	285	228	230
12	236	318	347	213	238	266	486	990	1,200	289	232	230
13	241	304	252	214	242	285	493	935	1,120	285	228	230
14	241	304		214	231	342	562	1,050	1,080	271	222	225
15	247	304		217	242	285	636	1,110	962	271	220	220
16	258	290	230	227	238	257	738	1,130	864	271	220	210
17	263	301		231	240	280	621	1,190	779	285	220	210
18	263	301	243	227	238	266	472	1,330	659	287	220	205
19	263	301		227	238	260	433	1,510	629	290	228	205
20	263	304		224	258	273	427	1,680	591	282	252	205
21	258	296	250	226	249	309	420	1,940	584	262	250	205
22	258	290		231	356	359	395	2,300	570	258	232	205
23	252	290		242	682	342	317	2,230	562	258	225	238
24	250	290	252	240	325	304	371	2,070	548	281	222	225
25	307	290	247	236	275	294	371	2,100	534	281	225	230
26	287	290	247	244	262	297	365	2,230	433	256	240	225
27	285	241	239	260	262	309	371	1,970	427	242	245	225
28	279	230	220	251	280	299	411	1,900	383	232	238	220
29	279	258	215	247	271	304	446	2,030	371	242	250	220
30	301	296	210	253	.....	294	506	2,000	353	238	240	220
31	312	.....	241	257	.....	315	.....	2,230	.....	232	238	.....

Monthly discharge of Provo River at Forks, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	312	203	269	16,500
November	315	244	267	15,900
December	392	190	258	15,900
January	.....	.....	191	11,700
February	236	197	218	12,100
March	657	200	361	22,200
April	755	335	504	30,000
May	1,110	460	785	48,300
June	730	200	313	18,600
July	202	135	174	10,700
August	142	126	133	8,180
September	263	135	174	10,400
The year	1,110	126	305	220,000
1919-20.				
October	312	205	253	15,600
November	330	230	297	17,700
December	347	210	260	16,000
January	260	202	231	14,200
February	682	231	272	15,600
March	453	257	304	18,700
April	738	285	443	26,400
May	2,300	591	1,390	85,500
June	2,000	353	971	57,800
July	342	232	271	16,700
August	258	220	234	14,400
September	238	205	223	13,300
The year	2,300	202	429	312,000

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SOUTH FORK OF PROVO RIVER AT FORKS, UTAH.

LOCATION.—In sec. 26, T. 5 S., R. 3 E., at Vivian Park summer resort, just above Forks, Utah County, a quarter of a mile above confluence with Provo River and 12 miles up Provo Canyon on highway and railroad from Provo to Heber.

DRAINAGE AREA.—30 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 17, 1911, to September 30, 1920.

GAGE.—Vertical staff nailed to cottonwood tree on right bank; established June 15, 1913; read by J. F. Carter. Datum raised 2 feet on June 12, 1915.

DISCHARGE MEASUREMENTS.—Made from foot log near gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel; fairly permanent. One channel at all stages; banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum discharge during year ending September 30, 1919, 45 second-feet on May 30 (gage height, 0.62 foot); minimum discharge, 21 second-feet at 8 a. m. September 3 (gage height, 0.48 foot).

Maximum stage recorded during year ending September 30, 1920, 1.40 feet on May 24 (discharge, 96 second-feet); minimum stage 0.36 foot on January 2 (discharge, 20 second-feet).

1911–1920: Maximum discharge, 96 second-feet, May 24, 1920. Minimum discharge, 20 second-feet, July 23, 1917, and January 2, 1920.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Below all diversions except a small ditch to a fish pond, having a maximum capacity of about 1 second-foot. The outflow from this pond enters Provo River above the gaging station, since station was moved to present site on July 21, 1920.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed frequently. Standard rating curve fairly well defined. Gage read to hundredths once daily. Daily discharge ascertained by shifting-control method. Records fair.

COOPERATION.—Sixteen discharge measurements furnished by Utah Power & Light Co. and three by T. F. Wentz, water commissioner.

Discharge measurements of South Fork of Provo River at Forks, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Oct. 3	L. W. Jordan	0.57	35.3	Jan. 21	A. B. Purton	.48	24.5
				Feb. 3	R. P. Flagel	.48	25.7
1919.				Mar. 11	do	.45	24.1
Feb. 19	do	.46	23.2	Apr. 28	do	.50	28.8
Apr. 1	A. B. Purton	.49	27.9	May 22	do	1.35	89
10	L. C. Monsons	.46	24.6	June 7	do	.92	56
May 7	do	.50	29.3	July 1	do	.64	33.5
June 4	J. W. Bones	.52	35.0	21	Flagel and Stoner	.65	30.3
21	H. L. Stoners	.44	27.0	Aug. 12	Thorum and Stoners	.78	37.6
July 14	do	.47	34.2	20	Wentz and Jacob	.86	38.1
Aug. 22	W. E. Dickinson	.46	25.3	25	T. F. Wentz[b]	.90	40.8
29	do	.46	27.1	Sept. 1	Flagel and Stoner	.90	40.6
Sept. 3	Flagel and Stoners	.49	22.1	7	T. F. Wentz	.82	34.5
Oct. 10	R. P. Flagels	.52	29.2				
Dec. 18	do	.48	26.9				

[a] Engineers for Utah Power & Light Co. [b] Water commissioner.

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Daily discharge, in second-feet, of South Fork of Provo River at Forks, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	33	30	28	25	23	25	28	26	37	29	32	22
2	33	30	28	25	23	25	29	27	37	29	32	22
3	33	30	28	25	23	25	28	28	35	29	32	21
4	34	30	28	25	23	25	28	28	34	29	32	35
5	33	27	28	25	23	25	26	28	34	30	32	33
6	31	27	28	25	23	25	26	29	34	28	31	33
7	31	26	28	25	23	25	26	29	34	28	28	31
8	31	26	28	25	23	26	26	28	34	28	28	31
9	31	26	28	25	23	26	25	29	33	31	29	28
10	31	26	28	25	23	26	25	31	25	29	28	28
11	31	28	28	25	23	26	25	29	23	29	28	28
12	31	28	28	25	23	26	25	30	26	28	28	28
13	31	28	28	25	23	26	25	30	25	32	28	28
14	31	28	28	25	23	26	25	35	23	35	28	28
15	30	31	27	24	23	26	26	37	25	34	27	28
16	30	29	28	24	23	26	26	34	27	35	26	28
17	28	26	28	24	23	26	26	34	27	34	26	28
18	31	28	28	24	23	26	26	33	26	36	28	26
19	30	29	27	24	23	26	25	33	26	36	28	28
20	30	29	27	24	23	26	25	31	26	33	29	28
21	28	29	27	24	23	26	26	31	26	33	28	29
22	28	29	27	24	23	27	26	32	30	34	28	29
23	30	29	26	24	24	27	25	32	26	34	30	29
24	30	29	26	24	24	27	25	32	26	34	30	29
25	30	29	26	24	24	27	25	32	29	34	30	30
26	28	29	26	24	24	27	25	32	29	34	29	30
27	30	29	26	24	24	27	26	33	27	33	29	27
28	30	29	26	24	24	28	26	40	27	33	29	25
29	30	29	26	24	.....	29	26	42	32	34	27	29
30	30	28	26	24	.....	29	26	45	30	33	25	28
31	30	.....	25	23	.....	28	.....	42	.....	33	23	.....
1919-20.												
1	33	29	29	23	26	25	25	31	78	34	34	41
2	34	29	29	20	26	31	25	33	60	34	34	40
3	29	28	29	22	26	28	25	38	57	34	36	39
4	29	29	29	25	26	26	25	40	42	33	35	38
5	29	29	29	25	26	25	25	42	42	29	35	37
6	31	29	29	25	26	25	25	42	42	29	35	36
7	31	29	29	25	26	25	25	45	54	25	35	35
8	29	29	29	25	26	25	25	47	51	24	35	36
9	29	29	29	25	26	26	25	47	56	26	38	37
10	29	29	29	25	26	26	25	51	50	26	38	38
11	29	29	29	25	25	26	25	49	50	26	38	39
12	29	29	31	25	25	26	26	51	48	33	38	39
13	29	29	29	25	25	26	26	51	46	31	38	48
14	29	29	29	25	25	25	33	51	46	29	38	43
15	29	29	29	25	25	25	31	56	46	27	38	43
16	29	29	29	25	25	25	33	61	46	27	38	43
17	29	29	28	25	25	25	33	59	41	27	38	43
18	29	29	28	25	25	25	33	64	39	27	38	42
19	29	29	28	25	25	25	29	69	37	28	42	42
20	29	29	28	25	25	25	29	72	37	29	38	42
21	29	29	28	25	25	25	29	75	37	30	39	42
22	29	29	28	25	26	25	29	75	37	31	40	42
23	29	29	28	25	29	25	29	81	37	31	40	44
24	29	29	28	25	26	25	29	96	37	34	41	47
25	29	29	28	26	25	25	29	90	37	32	41	47
26	29	29	28	26	25	25	29	90	37	32	41	42
27	29	29	28	26	25	25	29	78	32	34	46	42
28	29	29	28	26	25	25	29	69	32	34	44	42
29	29	29	28	26	25	25	29	67	35	33	44	42
30	29	29	28	26	.....	25	31	78	34	33	41	42
31	29	.....	27	26	.....	25	.....	84	.....	34	41	.....

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Monthly discharge of South Fork of Provo River at Forks, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	34	28	30.6	1,880
November	31	26	28.4	1,690
December	28	25	27.2	1,670
January	25	23	24.4	1,500
February	24	23	23.2	1,290
March	29	25	26.3	1,620
April	29	25	25.9	1,540
May	45	26	32.3	1,990
June	37	23	29.1	1,730
July	36	28	32.0	1,970
August	32	23	28.6	1,760
September	35	21	28.2	1,680
The year	45	21	28.1	20,300
1919–20.				
October	34	29	29.4	1,810
November	29	29	29.0	1,730
December	31	27	28.5	1,750
January	26	20	24.9	1,530
February	29	25	25.6	1,470
March	31	25	25.5	1,570
April	33	25	28.0	1,670
May	98	31	60.7	3,730
June	78	32	44.1	2,620
July	34	24	30.2	1,900
August	46	34	38.6	2,370
September	48	35	41.1	2,450
The year	96	20	33.8	24,600

SEVIER LAKE BASIN.

MAMMOTH CREEK NEAR HATCH, UTAH.

LOCATION.—In sec. 1, T. 37 S., R. 6 W., a quarter of a mile above flow line of former Hatchtown reservoir, three-quarters of a mile east of east boundary of Sevier National Forest, and 3½ miles southwest of Hatch, Garfield County.

DRAINAGE AREA.—151 square miles (measured on topographic maps).

RECORDS AVAILABLE.—July 15 to September 20, 1912; May 17, 1913, to August 22, 1914; October 1, 1915, to September 30, 1919, when station was discontinued. Also some miscellaneous measurements in 1911 and spring of 1912.

GAGE.—Stevens continuous water-stage recorder on left bank, May 2 to July 3, 1914, and September 23, 1915, to September 30, 1919; original gage, vertical staff on left bank, 1½ miles above present site, in sec. 2, T. 37 S., R. 6 W., July 15 to September 20, 1912, and May 25 to July 11, 1913; Stevens recorder at site and datum of original gage, July 12, 1913, to April 25, 1914.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 3.39 feet at 7 a. m. May 6 (discharge, 389 second-feet); minimum stage from water-stage recorder, 0.76 foot from 4 p. m. August 13 to 1 a. m. August 14 (discharge, 10 second-feet).

1912–1919: Maximum stage recorded, 4.32 feet at 4 a. m. June 10, 1917 (discharge, 795 second-feet); minimum discharge, 10 second-feet July 31, 1913, and August 13, 14, 1919.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Below all diversions.

REGULATION.—None.

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ACCURACY.—Stage-discharge relation permanent during 1919. Rating curve fairly well defined. Operation of water-stage recorder unsatisfactory May 9–12, June 28 to July 6, August 18–22, September 1–10, and 29,30. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Discharge estimated for periods of no gage-height record. Records good.

Discharge measurements of Mammoth Creek near Hatch, Utah, during the year ending Sept. 30, 1919.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 3	J. J. Sanford	1.08	25.2	June 8	G. H. Russell	1.68	56
Apr. 5	A. B. Purton	1.34	34.2	July 7	do	1.02	19.2
May 23	G. H. Russell	2.16	102	Aug. 23	do	.94	14.8

Daily discharge, in second-feet, of Mammoth Creek near Hatch, Utah, for the year ending Sept. 30, 1919.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	168	96	21	20	18	16	55	144	34	33	18	24
2	.....	172	90	21	24	19	17	54	139	32	28	22	21
3	.....	214	83	21	23	20	18	80	131	29	32	21	17
4	.....	258	73	20	23	20	19	110	125	29	29	20	16
5	32	318	69	20	23	21	20	124	113	25	24	19	16
6	37	324	66	20	24	21	21	178	110	25	22	18	17
7	36	290	61	19	24	22	22	258	110	24	21	17	20
8	30	253	58	18	23	22	23	296	110	24	22	16	14
9	27	238	55	15	16	23	24	304	109	23	41	18	16
10	26	224	52	16	13	23	25	304	114	21	25	20	20
11	27	209	44	16	11	23	26	238	108	22	21	26	21
12	28	194	43	18	10	20	27	188	100	22	20	26	22
13	37	180	42	23	10	13	28	162	96	22	20	20	21
14	50	172	37	24	16	13	29	136	158	22	22	18	21
15	53	158	34	36	17	13	30	136	109	22	41	18	21
							31	.....	105	.....	24	18	.....

NOTE.—No record for period in which discharge is not given.

Monthly discharge of Mammoth Creek near Hatch, Utah, for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 5–30	304	26	116	5,970
May	324	96	169	10,400
June	96	21	42.7	2,540
July	41	15	23.6	1,450
August	26	10	19.1	1,170
September	24	13	19.3	1,150
The period	.....	.....	.....	22,700

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SEVIER RIVER AT HATCH, UTAH.

LOCATION.—In SE. ¼ sec. 28, T. 36 S., R. 5 W., at county bridge a quarter of a mile east of J. C. Barnhurst's house at Hatch, Garfield County, and 1½ miles below dam site of former Hatchtown reservoir.

DRAINAGE AREA.—260 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 3, 1911, to September 30, 1920; fragmentary.

GAGE.—Stevens continuous water-stage recorder 50 feet below bridge, used since August 23, 1914; inspected by H. S. Barnhurst.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—One channel at all stages. Bed composed of sand and gravel.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 2.37 feet at 4 a. m. May 6 (discharge, 504 second-feet); minimum stage probably occurred during winter when no record was obtained.

Maximum stage during year ending September 30, 1920, from water-stage recorder, 4.20 feet at 6 a. m. May 24 (discharge estimated, 1,130 second-feet); minimum stage occurred during winter when no record was obtained.

1911–1920: Maximum stage occurred about 9 p. m. May 25, 1914, when Hatchtown reservoir dam failed (discharge not determined). Maximum stage recorded, 5.8 feet, June 5, 1912 (discharge, 1,210 second-feet); minimum flow, 10 second-feet on days in January, March, and April, 1912, while water was being stored at Hatchtown reservoir.

ICE.—Stage-discharge relation affected by ice at times.

DIVERSIONS.—Above all diversions except Hatch Bench canal and Panguitch Lake ditch, which divert a small quantity of water from Mammoth Creek. Hillsdale ditch diverts about 4 miles downstream and several other canals about 7 miles below for irrigation in Panguitch Valley.

REGULATION.—Entire flow controlled by gates in Hatchtown reservoir dam before May 25, 1914. No regulation since that date.

ACCURACY.—Stage-discharge relation changed about August 1, 1919. Rating curves well defined below 600 second-feet; extended above. Shifting-control method used July 26 to August 22, 1919. Operation of water-stage recorder satisfactory only for periods for which daily discharge is given. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. For other periods mean discharge estimated or interpolated. Records for 1919 good; for 1920 fair.

Discharge measurements of Sevier River at Hatch, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 3	J. J. Sanford	0.82	90	Aug. 23	G. H. Russell	0.69	65
1919.				1920.			
Apr. 5	A. B. Purton	.93	128	Jan. 18	A. B. Purton	[a] 1.31	73
May 16	Russell and Purton	1.46	256	June 20	R. R. Rowe	2.07	445
June 8	G. H. Russell	.95	131	Sept. 17	A. B. Purton	.93	122
July 25	do	.76	88				

[a] Stage-discharge relation affected by ice.

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Daily discharge, in second-feet, of Sevier River at Hatch, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.							
1	90	.....	279	185	97	102	102
2	90	.....	295	173	97	96	102
3	90	.....	334	163	97	106	88
4	.....	.....	378	154	97	89	85
5	.....	144	436	149	99	88	83
6	.....	163	442	144	99	86	78
7	.....	130	400	137	102	86	76
8	.....	120	369	132	99	80	74
9	.....	108	350	132	99	78	72
10	.....	106	353	127	99	78	72
11	.....	118	337	120	106	75	72
12	.....	137	329	118	111	77	65
13	.....	161	310	115	115	75	62
14	.....	180	297	108	111	78	62
15	.....	178	287	104	149	78	85
16	.....	168	266	102	95	83	76
17	.....	168	258	99	104	85	69
18	.....	206	248	97	111	89	65
19	.....	234	236	97	97	75	65
20	.....	251	221	97	86	73	88
21	.....	302	214	97	86	68	67
22	.....	367	214	111	84	67	62
23	.....	422	216	97	84	62	65
24	.....	428	214	97	120	67	65
25	.....	422	209	97	82	72	67
26	.....	367	199	97	80	81	69
27	.....	323	185	97	80	95	67
28	.....	300	180	97	89	67	67
29	.....	279	332	97	124	62	67
30	.....	279	209	97	116	62	67
31	.....	.....	185	.....	85	62	.....
1920.							
1	.....	.....	.....	975		203	126
2	.....	.....	.....	974	300		126
3	.....	.....	.....	974			126
4	.....	.....	.....	928		230	126
5	.....	.....	.....	922	276		142
6	.....	.....	.....	952	273		152
7	.....	.....	.....	516	262	254	134
8	.....	.....	.....	445	254	256	126
9	.....	.....	.....	439	242	198	124
10	.....	.....	424	409	237	189	126
11	.....	.....	486	370	234	178	124
12	.....	.....	548	320	226		124
13	.....	.....	611	276		150	124
14	.....	.....		262			124
15	.....	.....		359			124
16	.....	.....	700	456	180	129	126
17	.....	.....		553		162	124
18	.....	.....		522		136	122
19	.....	.....	797	482		132	119
20	.....	.....	918	442		147	119
21	.....	.....	1,020	406	139	144	119
22	.....	.....	1,090	382	173	136	119
23	.....	.....	1,070	364	176	130	119
24	.....	.....	1,100		220	134	122
25	.....	.....	984		176	139	122
26	.....	.....		340	170	136	
27	.....	.....			168	132	
28	.....	.....	980		162	129	120
29	.....	.....			212	126	
30	.....	.....			226	124	
31	.....	.....		.....	192	124	.....

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Monthly discharge of Sevier River at Hatch, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919.				
April 5-30	428	106	233	12,000
May	442	180	283	17,400
June	185	97	118	7,020
July	149	80	100	6,150
August	106	62	78.8	4,850
September	102	62	73.5	4,370
The period				51,800
1920.				
May 10-31	1,100	424	878	36,500
June	975	262	504	30,000
July			215	13,200
August	256	124	167	10,300
September	152		125	7,440
The period				97,400

SEVIER RIVER NEAR CIRCLEVILLE, UTAH.

LOCATION.—In sec. 29, T. 31 S., R. 4 W., 2½ miles above mouth of Pine Creek and 8 miles southwest of Circleville, Piute County.

DRAINAGE AREA.—950 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 10 to September 19, 1912; April 23, 1914, to September 30, 1920.

GAGE.—Stevens continuous water-stage recorder, with outside and inside staff gages; installed April 23, 1914; inspected by J. P. Meeks.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—One channel at all stages; stream bed composed of sand and rocks; shifting.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, not ascertained (intake clogged); minimum stage recorded, 2.12 feet July 8-11 (discharge, 52 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 6.56 feet at 1.30 p. m. May 23 (discharge, 1,110 second-feet); minimum stage from water-stage recorder, 2.39 feet at 10 p. m. July 20 (discharge, 72 second-feet).

1912–1920: Maximum stage occurred in 1914 during flood resulting from failure of Hatchtown dam; discharge not determined. Maximum stage recorded, 8.0 feet August 6, 1916 (discharge estimated, 1,600 second-feet); minimum stage recorded in 1919.

ICE.—Stage-discharge relation affected by ice during some winters.

DIVERSIONS.—Above all diversions for Circle Valley; below several diversions for Hatchtown project and Panguitch Valley.

REGULATION.—Flow was affected somewhat by operation of Hatchtown reservoir until dam broke, May 25, 1914. No regulation except by diversion since that date.

ACCURACY.—Stage-discharge relation not permanent; affected by ice December 27, 1918, to February 1, 1919, and November 24, 1919, to February 23, 1920. A number of slight shifts in control occurred during 1919 and 1920. From about January 1 to May 16, 1919, the intake pipe was partially clogged: discharge from January April 4 estimated by comparison with the station near Kingston; from April May 16, daily discharge (to nearest 5 second-feet) ascertained by applying

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to daily mean gage height a rating table based on current-meter measurement made April 6 and referred to the gage height in the well. Rating curves are practically parallel and are well defined below 400 second-feet and extended above. Operation of water-stage recorder satisfactory except for periods of ice effect, and several periods indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Discharge for periods of ice effect estimated from meter measurements and temperature records. Discharge for periods when recorder was not in operation estimated from weekly staff gage readings, or interpolated. Records for periods estimated are fair; others good.

Discharge measurements of Sevier River near Circleville, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 4	J. J. Sanford	2.82	125	July 17	G. H. Russell	2.49	83
Nov. 6	do	2.76	119	Aug. 5	do	2.57	88
1919.				Sept. 3	do	2.60	97
Jan. 6	A. B. Purton	[a] 3.03	87	1920.			
Apr. 6	do	3.53	302	Jan. 17	A. B. Purton	[a] 3.20	133
May 17	Russell and Purton	2.85	150	June 20	R. R. Rowe	3.74	325
June 9	G. H. Russell	2.39	77	Sept. 16	A. B. Purton	2.91	141
27	do	2.15	54				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Sevier River near Circleville, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	128	110	157					415	287	62	100	67
2	125	107	150				350	380	252	82	146	89
3	118	107	155					355	240	67	137	101
4	128	109	155					335	221	67	89	102
5	125	116	157				330	335	187	61	89	93
6	134	124	161				300	340	127	58	86	90
7	128	120	210				290	345	102	55	92	88
8	125	132	205	100	125	140	275	345	92	52	260	87
9	122	150	161				265	340	78	52	142	90
10	124	155	153				250	315	63	52	132	92
11	116	157	146				255	295	62	52	120	92
12	112	150	157				265	225	60	65	112	90
13	112	152	137				280	200	58	65	101	90
14	110	161	139				300	185	56	104	90	89
15	110	165	148				315	170	56	92	86	94
16	113	153	155				330	160	56	125	84	109
17	112	150	165			250	345	146	60	88	81	104
18	106	161	167				365	139	66	114	84	101
19	109	174	161				400	128	65	94	72	98
20	112	165	152				435	118	62	95	66	102
21	122	161	163		140		445	107	62	93	63	101
22	118	153	152				455	100	61	79	63	98
23	116	161	144	110			475	93	61	73	62	100
24	114	172	139				485	88	60	69	62	104
25	112	150	120				495	82	56	72	64	104
26	110	150	112			350	500	81	54	72	61	106
27	105	152	100				495	77	54	72	62	107
28	106	153	105				485	88	54	69	71	105
29	107	155	115		.....		470	494	54	71	65	106
30	110	156	120		.....		445	390	54	81	64	106
31	110	.....	115		.....		.....	337	.....	84	64	.....

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Daily discharge, in second-feet, of Sevier River near Circleville, Utah, for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	104	105				191	124	500	919		199	108
2	104	118				290	143	538	898		208	104
3	102	119				278	132		878		288	112
4	94	119	110			215	130		861		310	109
5	95	119				184	141		838		268	129
								635		150		
6	95	119				176			820		242	168
7	101	124				166			798		224	161
8	101	125				155	175		770		212	166
9	100	118		120		155		736	736		247	163
10	100	120				161		750	703		221	139
					122							
11	100	135				157	206	750	666	119	165	155
12	100	124				143		711	630	112	139	153
13	97	127				144		714	590	101	118	148
14	93	135				155		714	576	95	103	137
15	92	137				150	230	666	538	92	89	136
16	90	137				141		622	485	97	88	141
17	88	139		133		137		611	433	95	91	152
18	84	140				134	252	636	391	82	111	139
19	81	144				137		720	350	82	127	134
20	81	144	100			139		849	320	76	144	129
21	82	140			150	153	240	872	305	75	122	127
22	82	134			170	150		986	300	80	116	127
23	82	130			180	148		1,100	292	104	107	134
24	85				191	146		1,080	288	182	104	136
25	98			130	166	143	233	994	283	219	102	137
26	96				136	141		980	278		104	137
27	92	120			118	139		951	295		104	137
28	86				103	132	350	916	399	200	104	137
29	90				96	124		930	305		106	132
30	94					136		942	200	178	102	127
31	98					143		933		197	106	

NOTE.—Water-stage recorder not in operation, and only weekly staff gage readings obtained, Nov. 27–30, 1918, Jan. 7–11, 14–18, 26–31, Feb. 1, 25–28, Mar. 1, 1919, Nov. 27, 1919, to Feb. 22, 1920, Mar. 22–26, Apr. 6 to May 8, June 30 to July 10, and July 26–29, 1920. Braced figures indicate mean discharge for period included.

Monthly discharge of Sevier River near Circleville, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	134	105	116	7,130
November	174	107	146	8,690
December	210	100	148	9,100
January			105	6,460
February			132	7,330
March			233	14,300
April	500	250	372	22,100
May	494	77	233	14,300
June	287	54	94.0	5,590
July	125	52	75.4	4,640
August	260	61	92.6	5,690
September	109	67	96.8	5,760
The year		52	154	111,000
1919–20.				
October	104	81	93.1	5,720
November	144	105	126	7,500
December			102	6,270
January			125	7,690
February	191		129	7,420
March	290	124	160	9,840
April		124	227	13,500
May	1,100	500	775	47,700
June	919	200	538	32,000
July		75	138	8,480
	310	88	154	9,470
	168	104	138	8,210
r	1,100	75	226	164,000

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SEVIER RIVER NEAR KINGSTON, UTAH.

LOCATION.—In NW. ¼ sec. 16, T. 30 S., R. 3 W., 1 mile above site used until September 18, 1918, 2 miles above mouth of East Fork, and 1 mile west of Kingston, Piute County.

DRAINAGE AREA.—1,110 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 12, 1914, to September 30, 1920; also several miscellaneous measurements in 1911 published in Water-Supply Paper 310 as "South Fork near Junction, Utah."

GAGE.—Stevens continuous water-stage recorder on left bank with outside and inside staff gages; established September 20, 1918: inspected by W. S. Price.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Concrete control 10 feet below gage. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 2.34 feet at 2 a. m. April 26 (discharge, 520 second-feet); minimum stage from water-stage recorder, 0.70 foot on July 6 (discharge, 13 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 3.80 feet at 10 p. m. May 23 (discharge, 1,260 second-feet). Stage and discharge were probably slightly higher during the preceding week when recorder was not in operation. Minimum stage from water-stage recorder, 0.82 foot July 21–23 (discharge, 23 second-feet).

1914–1920: Maximum discharge recorded, 1,260 second-feet, May 23, 1920; minimum stage 0.70 foot on July 6, 1919 (discharge, 13 second-feet).

ICE.—Stage-discharge relation affected by ice each winter.

DIVERSIONS.—Below all diversions above mouth of East Fork.

REGULATION.—Flow affected by diversions for irrigation.

ACCURACY.—Stage-discharge relation for low stages changed slightly April 25, 1919; affected by ice January 1–18 and November 26 to December 8, 1919. Rating curves well defined below 600 second-feet and extended above. Operation of water-stage recorder satisfactory except for periods when daily determinations of discharge are not given. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Discharge for periods of ice effect or missing gage-height record estimated or interpolated. Records good where daily discharge determinations are given; estimated periods fair.

Discharge measurements of Sevier River near Kingston, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 5	J. J. Sanford	1.14	81	June 20	G. H. Russell	.73	14.3
Nov. 7	do	1.28	109	July 18	do	.78	19.8
				Sept. 4	do	1.07	55
1919.				1920.			
Jan. 6	Purton and Sanford	[a] 3.58	125	Jan. 17	A. B. Purton	1.14	77
Apr. 4	A. B. Purton	2.02	373	June 21	R. R. Rowe	1.54	189
May 15	Purton and Russell	1.23	94	Sept. 16	A. B. Purton	1.33	121
June 1	G. H. Russell	1.27	103				

[a] Stage-discharge relation affected by ice.

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Daily discharge, in second-feet, of Sevier River near Kingston, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	92	107	172		166	153	364	281	108	15	19	31
2	88	109	172		153	153	364	269	103	21	28	35
3	90	109	169		146	172	368	250	93	15	31	57
4	90	107	182		150	166	377	238	61	15	21	52
5	86	107	179		150	156	335	285	59	15	21	48
6	81	107	182		137	150	330	330	41	13	19	41
7	90	109	269		143	153	318	289	37	14	19	36
8	92	121	269		146	153	277	250	35	15	149	37
9	90	129	220		156	166	254	242	29	15	129	39
10	90	146	199	140	166	166	235	238	23	15	98	39
11	90	146	189		179	159	235	192	21	15	52	39
12	92	143	196		179	162	246	162	19	15	43	38
13	94	143	189		169	175	273	149	18	16	29	33
14	102	149	192		162	199	314	108	17	19	22	29
15	107	146	199		172	179	322	93	15	19	21	30
16	107	156	199		175	179	314	88	15	23	23	31
17	105	156	182		179	179	310	71	18	19	29	31
18	107	159	182		186	238	330	39	18	20	30	30
19	100	172	182	172	175	382	368	31	16	19	28	33
20	102	172	179	172	169	314	382	31	15	18	23	35
21	107	172	179	169	162	399	404	31	18	18	24	38
22	105	171	172	146	150	386	417	32	19	17	25	42
23	105	170	169	146	172	373	458	31	19	17	28	39
24	109	170	166	146	175	377	490	29	19	17	28	37
25	109	169	143	146	162	356	490	25	19	16	28	36
26	109	153	132	143	156	356	490	23	19	16	27	33
27	109	169	129	140	169	417	435	23	17	16	28	35
28	109	162	143	132	156	356	412	22	16	16	28	33
29	105	166	150	132	.....	335	364	172	15	16	28	31
30	105	172	156	146	.....	335	322	293	15	16	27	33
31	107	.....	150	156	.....	360	.....	153	.....	16	30	.....
1919–20.												
1	39	112		52	168	214	162	500	1,020		100	85
2	42	110		52	175	316	162	536			246	79
3	45	118		52	182	316	162	536	930	100	486	72
4	50	118		52	165	246	162	536			445	76
5	50	121	120		172	214	162				354	81
6	55	115			203	206			840	66	283	110
7	59	110			186	189		600		61	246	118
8	55	112			178	178				56	221	136
9	55	112			175	178	200	690		52	272	139
10	55	118		60	168	178			700	47	242	136
11	53	123	100		165	178				42		133
12	52	136			158	175	224			40		133
13	53	133			155	178		640		38		124
14	50	139			152	175			568	36	150	102
15	50	142	74		149	172	250		486	34		107
16	48	136			158	168		554	410	32		115
17	50	136		74	162	168			350	30	55	102
18	50	136	70	90	162	168	283		299	28	102	87
19	55	136		97	158	175			242	26	172	85
20	64	136		112	162	178		900	221	24	221	83
21	87	133	66	118	178	182	270		168	23	178	81
22	83	133		127	239	189			155	23	127	87
23	105	132		136	346	184		1,260	136	23	121	90
24	107	130		133	293	180		1,190	121	53	115	87
25	102	121	60	121	287	176	253	1,140	110	70	112	79
26	87			118	251	172		1,120	112	64	110	79
27	90			124	235	168		1,120	142	48	110	83
28	90	120		130	219	168	350	1,080	376	44	107	81
29	92			145	203	165		1,050	333	36	97	76
30	102		52	142	.....	162		1,010	232	52	87	68
31	112	.....	52	162	.....	162	.....	1,020	.....	70	87	.....

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Monthly discharge of Sevier River near Kingston, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	109	81	99.2	6,100
November	172	107	145	8,630
December	269	129	180	11,100
January	.....	.....	144	8,850
February	186	137	163	9,050
March	417	150	252	15,500
April	490	235	353	21,000
May	330	22	144	8,850
June	103	15	31.1	1,850
July	23	13	16.7	1,030
August	140	19	36.0	2,210
September	57	29	36.7	2,180
The year	490	13	133	96,400
1919-20.				
October	112	39	67.3	4,140
November	155	110	125	7,440
December	.....	.....	85.0	5,230
January	162	.....	88.9	5,470
February	346	149	192	11,000
March	316	162	190	11,700
April	.....	162	246	14,600
May	.....	500	806	49,600
June	.....	110	498	29,600
July	.....	23	52.2	3,210
August	486	55	181	11,100
September	139	68	97.1	5,780
The year	.....	23	219	159,000

PIUTE RESERVOIR NEAR MARYSVALE, UTAH.

LOCATION.—In NW. ¼ sec. 3, T. 29 S., R. 3 W., at Piute dam, 11 miles south of Marysvale, Piute County.

RECORDS AVAILABLE.—March 22, 1914, to September 30, 1920.

GAGE.—Iron pins driven every foot into rock face at outlet gates; readings between footmarks are measured with a graduated scale.

COOPERATION.—Storage capacity table furnished by State engineer.

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Daily contents, in acre-feet, of Piute reservoir near Marysvale, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1.....	0	2,000	7,600	18,500	27,300	36,600	47,900	52,000	33,300	19,400	6,400	1,300
2.....	40	2,300	7,650	18,600	27,600	36,900	49,200	51,500	33,100	18,900	6,000	1,000
3.....	30	2,400	8,000	19,000	27,900	37,200	50,000	51,000	32,900	18,200	5,900	900
4.....	75	2,500	8,400	19,200	28,200	37,500	51,200	50,000	32,500	17,800	5,500	700
5.....	0	2,700	8,600	19,400	28,500	37,900	52,500	49,500	32,300	17,300	5,200	600
6.....	20	2,800	9,000	19,500	29,000	38,100	52,600	49,000	31,800	16,700	4,800	400
7.....	40	2,900	9,500	19,700	29,400	38,300	53,500	48,600	31,200	16,200	4,500	250
8.....	20	3,100	10,000	20,000	30,000	38,600	54,000	48,000	30,800	15,500	4,400	0
9.....	0	3,300	10,500	20,400	30,300	38,800	55,000	47,300	30,300	15,000	4,500	0
10.....	0	3,400	11,000	20,600	30,500	39,000	55,400	46,800	29,800	14,600	4,900	0
11.....	0	3,700	11,400	20,800	30,800	39,200	55,700	46,000	29,200	14,300	5,100	0
12.....	0	4,000	11,700	21,100	31,000	39,600	55,700	45,400	28,600	14,100	5,600	0
13.....	0	4,300	12,000	21,300	31,300	40,000	55,600	44,400	28,000	13,700	5,400	0
14.....	0	4,400	12,500	21,700	31,700	40,400	55,400	43,600	27,600	13,400	5,400	0
15.....	0	4,600	13,000	22,000	32,000	40,700	55,400	42,600	27,200	13,000	5,200	0
16.....	0	4,800	13,300	22,200	32,300	41,000	54,400	41,500	26,500	12,700	5,100	0
17.....	0	5,000	13,700	22,500	32,700	41,200	54,300	41,000	26,100	12,300	4,700	0
18.....	0	5,200	14,000	22,700	33,100	41,600	54,400	40,000	25,600	12,000	4,500	0
19.....	0	5,600	14,400	23,000	33,500	42,000	55,700	39,000	25,200	11,700	4,300	0
20.....	60	5,800	14,600	23,400	33,800	42,700	56,000	38,400	24,800	11,400	4,100	0
21.....	200	6,000	15,200	23,800	34,100	43,500	56,400	38,000	24,300	11,000	3,900	0
22.....	400	6,400	15,700	24,000	34,400	44,000	57,000	37,300	23,900	10,700	3,700	0
23.....	500	6,600	15,800	24,400	34,800	45,000	57,200	36,700	23,400	10,000	3,500	300
24.....	800	6,700	16,200	24,700	35,100	45,400	57,800	36,000	22,900	9,700	3,200	100
25.....	900	7,000	16,400	25,200	35,400	46,000	58,000	35,600	22,300	9,400	3,000	0
26.....	1,000	7,050	16,800	25,500	35,700	46,800	57,000	35,000	21,800	9,000	2,800	0
27.....	1,200	7,100	17,100	25,900	36,000	47,200	56,000	34,500	21,200	8,800	2,500	0
28.....	1,500	7,400	17,300	26,100	36,400	48,000	55,000	34,000	20,900	8,500	2,300	0
29.....	1,600	7,500	17,500	26,500	.....	48,200	54,000	33,900	20,500	8,000	2,000	0
30.....	1,800	7,550	17,800	26,800	.....	48,400	53,000	33,800	20,000	7,100	1,600	0
31.....	1,850	.....	18,000	27,000	.....	48,300	.....	33,600	.....	6,700	1,500	.....
1919-20.												
1.....		600	8,700	16,700	24,200	36,000	47,400	47,700	65,900	59,000	42,200	24,900
2.....		1,250	9,000	17,000	24,600	36,400	47,600	47,600	66,200	58,600	41,700	24,300
3.....		1,400	9,300	17,100	25,000	37,000	47,900	47,600	67,200	58,100	41,900	23,800
4.....		1,700	9,600	17,200	25,400	37,400	48,300	47,700	67,100	57,800	42,200	23,200
5.....		1,700	10,200	17,300	25,800	37,800	48,500	47,900	67,000	57,200	42,400	22,900
6.....		1,700	10,700	17,500	26,000	38,400	48,800	48,000	66,800	56,900	42,400	22,500
7.....		1,650	11,400	17,600	26,400	38,800	49,100	48,000	66,000	56,000	42,200	22,300
8.....		1,650	12,000	17,800	26,800	39,200	49,500	48,100	66,400	55,000	42,000	21,900
9.....		1,650	12,400	18,000	27,200	39,400	49,700	48,400	66,500	54,500	41,900	21,700
10.....		1,600	12,800	18,200	27,800	39,800	49,800	48,800	66,800	54,000	41,700	21,400
11.....		1,600	13,000	18,300	28,200	40,200	49,500	49,100	66,600	53,300	41,400	21,100
12.....		1,600	13,400	18,400	28,500	40,400	49,100	49,400	66,500	52,700	41,100	20,700
13.....		1,600	13,600	18,600	28,800	41,000	49,300	49,600	66,400	52,300	40,800	20,300
14.....		1,600	13,800	18,800	29,000	41,200	49,500	49,800	66,200	51,900	40,000	19,800
15.....	0	1,800	14,100	19,000	29,500	41,600	50,200	50,100	66,000	51,700	39,300	19,300
16.....		2,500	14,200	19,200	29,700	42,000	50,600	50,200	65,600	51,100	38,700	18,900
17.....		2,900	14,300	19,400	30,100	42,200	50,200	50,400	64,800	50,600	38,000	18,900
18.....		3,200	14,400	19,700	30,500	42,600	50,200	50,400	64,200	50,000	37,400	18,400
19.....		3,700	14,500	19,800	30,900	42,800	50,200	50,600	63,800	49,600	36,600	18,000
20.....		4,400	14,700	20,400	31,200	43,300	50,000	50,900	63,200	48,900	35,700	17,600
21.....		5,100	14,900	20,600	31,600	43,600	49,800	51,400	62,700	48,300	35,100	17,200
22.....		5,200	15,000	20,800	32,000	43,800	49,700	52,100	62,200	47,700	34,300	16,800
23.....		5,600	15,100	21,100	32,800	44,100	49,500	53,600	61,800	47,000	33,400	16,200
24.....		6,000	15,200	21,400	33,400	44,400	48,900	55,800	61,200	46,400	32,600	15,600
25.....		6,400	15,400	21,600	33,600	44,800	48,600	58,000	60,600	45,900	31,100	15,000
26.....		6,800	15,600	22,000	34,000	45,200	48,300	59,900	60,000	45,500	30,300	14,500
27.....		7,200	15,800	22,200	34,600	45,200	47,800	61,100	59,400	45,200	29,500	13,900
28.....		7,500	16,000	22,500	35,200	46,100	47,500	62,400	59,000	44,700	28,300	13,500
29.....		7,800	16,200	22,900	35,600	46,400	47,100	63,200	59,100	44,100	27,600	12,800
30.....	25	8,200	16,400	23,400	.....	46,700	47,400	64,000	59,100	43,600	26,500	12,100
31.....	100	.....	16,600	23,800	.....	47,100	.....	64,900	.....	42,800	25,500	.....

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SEVIER RIVER BELOW PIUTE DAM, NEAR MARYSVALE, UTAH.

LOCATION.—In sec. 34, T. 28 S., R. 3 W., 700 yards below dam of Piute reservoir, 11 miles south of Marysvale, Piute County.

DRAINAGE AREA.—2,440 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 17 to August 31, 1911; May 1, 1912, to September 30, 1920.

GAGE.—Friez water-stage recorder established May 1, 1912; inspected by M. C. Jensen.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and loam. One channel at all stages. Control is a riffle of heavy gravel and rocks located at the gage; practically permanent, shifting only slightly during high stages.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 2.61 feet at 4 p. m. April 25 (discharge, 1,050 second-feet); no flow April 5–10 when reservoir gates were closed.

Maximum stage during year ending September 30, 1920, from water-stage recorder, 2.50 feet at 2 p. m. August 21 (discharge, 930 second-feet). From November 19 to April 7 reservoir gates were closed (discharge estimated 0.5 second-foot).

1911–1920: Maximum stage recorded, 3.00 feet from 4 a. m. to 4 p. m. May 27, 1914 (discharge, 1,380 second-feet); practically zero discharge when reservoir gates were closed April 5–10, 1919.

ICE.—Stage-discharge relation affected by ice during most winters.

DIVERSIONS.—No water diverted between this station and Piute reservoir.

REGULATION.—Flow past station controlled by operation of gates in dam above.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Operation of water-stage recorder satisfactory, except January 1–6, 1919, and May 23–29, 1920. Recorder not operated during periods when reservoir gates were closed, April 5–10, and November 1–3, 1919, and November 19, 1919, to April 7, 1920. Daily discharge ascertaind by applying to rating table the daily mean gage height determined from recorder graph. Discharge for periods when reservoir gates were closed represents leakage through gates and was estimated. Records excellent.

Discharge measurements of Sevier River below Piute dam, near Marysvale, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 8	J. J. Sanford	1.27	231	July 18	G. H. Russell	1.86	492
Nov. 7	do	.62	95	Aug. 25	do	1.52	334
1919.				Sept. 12	do	.85	136
Jan. 6	Purton and Sanford	.02	28.2				
May 18	Purton and Russell	1.89	486	1920.			
June 1	G. H. Russell	1.43	300	June 19	R. R. Rowe	2.03	586
19	do	1.84	466	Sept. 15	A. B. Purton	2.01	568

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Daily discharge, in second-feet, of Sevier River below Piute dam, near Marysvale, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	209	141	154		37	40	252	788	285	517	484	272
2	220	141	125		37	40	16	650	335	524	478	266
3	220	141	77		37	40	9	650	390	531	484	257
4	223	116	71	30	37	39	6	643	390	531	471	251
5	220	94	71		38	39	0	643	390	531	464	239
6	209	94	71		38	38	0	636	385	524	458	228
7	217	94	71	33	38	39	0	636	423	497	445	212
8	237	97	71	33	38	39	0	636	440	484	440	172
9	225	97	65	33	38	39	0	636	434	478	368	143
10	209	99	39	33	38	40	0	636	428	478	194	135
11	209	99	27	34	39	40	70	629	434	484	194	137
12	217	101	29	34	38	40	326	629	458	484	196	131
13	209	102	30	34	38	40	326	622	452	490	196	123
14	209	102	31	35	38	40	322	629	452	490	222	116
15	214	104	31	35	38	40	322	615	452	484	337	123
16	214	104	33	35	38	40	322	566	458	484	337	120
17	204	105	33	35	39	40	322	510	471	490	337	116
18	199	94	33	35	39	40	322	504	465	484	334	114
19	191	77	34	35	39	40	322	497	465	484	330	118
20	160	77	35	35	40	40	322	445	471	490	326	111
21	139	78	37	36	40	41	322	396	484	484	326	105
22	149	80	41	36	40	41	391	390	484	484	322	64
23	149	99	42	36	40	41	594	352	478	490	318	47
24	141	149	40	36	40	41	377	288	471	484	322	231
25	139	149	37	36	40	41	947	288	465	478	318	121
26	125	152	39	36	40	88	1,040	288	490	484	315	114
27	129	152	40	36	40	135	1,030	285	524	484	307	112
28	131	152	32	36	40	194	1,020	285	524	484	301	109
29	133	152	31	37	.....	304	1,080	281	524	510	297	105
30	135	154	30	37	.....	470	1,020	281	517	664	291	107
31	139	.....	30	37	.....	822	.....	281	.....	490	285	.....
1919-20.												
1	105	1						431	228	592	639	770
2	108	1						431	228	586	639	592
3	110	1						426	527	586	639	560
4	112	75					.5	445	725	592	639	566
5	120	201						460	794	599	646	560
6	114	201						466	802	592	646	560
7	114	201						471	560	586	653	554
8	118	201					94	486	471	599	646	554
9	114	201					219	492	471	606	618	554
10	118	199					302	486	525	606	592	560
11	114	199					302	486	537	606	625	573
12	118	199					302	486	543	606	653	586
13	116	199					96	486	537	606	653	586
14	116	199					47	492	537	606	653	580
15	118	89			.5		95	497	531	612	653	573
16	116	15	.5	.5		.5	293	497	531	618	646	573
17	112	7					399	497	525	618	639	573
18	112	4					403	492	543	612	748	573
19	121						403	492	580	612	890	566
20	121						436	441	580	606	874	566
21	121						466	417	580	606	874	560
22	139						471	360	573	606	866	560
23	137						481	307	573	612	866	554
24	152						492	295	566	646	850	566
25	154	.5					502	283	586	639	842	586
26	154						514	270	592	639	834	573
27	156						514	258	592	632	826	560
28	158						497	246	592	632	826	554
29	160						455	234	592	625	826	554
30	163				.....		426	228	592	612	818	560
31	123				.....		.....	228	.....	632	802	.....

Discharge estimated for following periods: Jan. 1-6, Sept. 22-26, Oct. 2, 3, 26-30, Nov. 1-4, Nov. 1919; Jan. 1 to Apr. 7, and May 23-29, 1920.

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Monthly discharge of Sevier River below Piute dam, near Marysvale, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	237	125	185	11,400
November	154	77	113	6,720
December	154	27	49.4	3,040
January	37	.....	34.1	2,100
February	40	37	38.6	2,140
March	822	38	97.1	5,970
April	1,040	0	368	21,900
May	788	281	504	31,000
June	524	285	445	26,500
July	664	478	500	30,700
August	484	194	339	20,800
September	272	47	150	8,930
The year	1,040	0	236	171,000
1919-20.				
October	163	105	126	7,750
November	201	.....	73.3	4,360
December	.....	.....	.5	31
January	.....	.....	.5	31
February	.....	.....	.5	29
March	.....	.....	.5	31
April	514	.....	274	16,300
May	497	228	406	25,000
June	802	228	554	33,000
July	646	586	611	37,600
August	890	592	730	44,900
September	770	554	574	34,200
The year	890	.....	280	203,000

SEVIER RIVER AT SEVIER, UTAH.

LOCATION.—In E. ½ sec. 32, T. 25 S. R. 4 W., at Sevier, Sevier County, 100 yards above railroad bridge on Y spur, and 50 yards west of main-line track of Denver & Rio Grande Western Railroad. Clear Creek enters Sevier River immediately above this station. Prior to November 15, 1916, Clear Creek entered Sevier River 45 yards below this station.

DRAINAGE AREA.—2,850 square miles including Clear Creek which was diverted into Sevier River above this station on November 15, 1916; 2,700 square miles exclusive of Clear Creek. Areas measured on topographic maps.

RECORDS AVAILABLE.—May 20, 1911, to September 30, 1920.

GAGE.—Stevens continuous water-stage recorder on right bank, installed March 30, 1920, to replace Fries 8-day water-stage recorder which had been in use since May 16, 1912; inspected by R. W. Levi.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Permanent except at sudden high stages.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 3.87 feet at 7 p. m. April 27 (discharge, 1,010 second-feet); minimum stage from water-stage recorder, 1.44 feet at noon September 24 (discharge, 42 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 4.20 feet at noon June 6 (discharge, 1,200 second-feet); minimum stage from water-stage recorder, 1.15 feet at 2 p. m. November 27 (discharge, 10 second-feet).

1911-1920: Maximum stage recorded, 4.75 feet at 6 p. m. June 3, 1914 (discharge, 1,600 second-feet); minimum stage, 1.15 feet at 2 p. m. November 27, 1919 (discharge, 10 second-feet).

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ICE.—Stage-discharge relation affected by ice for short periods.

DIVERSIONS.—A few small ditches divert between the station and Piute dam.

REGULATION.—Flow past the station practically controlled by operation of gates in Piute dam, about 27 miles above.

ACCURACY.—Stage-discharge relation changed slightly in July, 1919. Rating curves well defined. Water-stage recorder operated satisfactorily except for periods indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Discharge estimated from weekly staff gage readings for periods of faulty gage-height record. Records for periods estimated are fair; others are good.

Discharge measurements of Sevier River at Sevier, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 7	J. J. Sanford	2.52	296	July 15	G. H. Russell	3.00	494
Nov. 4	do	2.10	180	Aug. 4	do	2.95	474
12	do	1.92	138	27	do	2.62	325
1919.				Sept. 18	do	1.96	134
Jan. 7	A. B. Purton	[a] 1.64	61	1920.			
Apr. 4	do	1.81	113	Jan. 14	A. B. Purton	1.34	26.6
May 14	Russell and Purton	3.43	735	June 18	R. R. Rowe	3.48	713
31	G. H. Russell	2.86	474	Sept. 14	A. B. Purton	3.19	569
June 21	do	3.02	522				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Sevier River at Sevier, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	246	176	181				720	982	436	550	498	292
2	246	176	176				320	868	414	550	483	284
3	246	176					320	775	414	550	478	276
4	271	176		60			115	763	422	550	474	268
5	325	176				75	112	811	432	550	474	260
6	311	164	110				109	805	443	534	464	250
7	294	153		61			109	781	455	517	454	240
8	287	142					101	763	464	500	449	224
9	280	138				81	93	746	479	483	440	182
10	264	136				82	85	717	484	488	263	162
11	246	136				83	85	700	484	498	221	152
12	240	136				84	183	706	488	503	207	152
13	240	136				85	267	734	488	508	198	146
14	240	136				86	371	734	493	503	196	141
15	240	136			65	87	371	734	493	508	240	135
16	240	136				88	371	740	488	498	340	141
17	240	136				91	375	717	488	498	340	135
18	234	136	60			94	392	683	498	493		130
19	234	136		62		97	409	632	508	493		126
20	228	134				100	428	632	508	493		126
21	209	132				103	450	593	514	498	340	124
22	184	130				106	484	561	514	493		124
23	181	128				109	635	506	524	493		71
24	181	158				112	717	560	529	488		138
25	181	188	62			116	580	498	540	488	340	190
26	176		65			120	926	474	550	488	336	130
27	171	190	65			200	998	469	550	493	328	130
28	171		65			200	958	469	550	498	324	126
29	171		67		.....	300	952	519	550	498	320	124
30	176	191	82		.....	438	946	498	550	561	309	122
.....	176	.....	55		.....	550	.....	440	.....	572	300	.....

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Daily discharge, in second-feet, of Sevier River at Sevier, Utah, for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	119	110	31	29	28	31	33	578	794	752	686	
2	117	50	30	29	37	40	37	578	728	740	698	
3	117	38	32	29	36	33		572	692	728	734	676
4	119	36	33	29	32	29		547	1,020	704	722	
5	131	132	38	28	32	26		557	1,130	692	698	
							45					
6	131	199	33	27	31	26		547	1,170	692	692	552
7	129	204	31	26	29	26		557	1,130	680	704	
8	131	204	29	25	28	38		606	920	668	704	
9	131	191	17	24	25	38	181	622	890	674	716	662
10	127	191	19	23	31	36	268	639	866	680	668	
11	131	194	33	23	28	30	311		848	674	668	
12	131	194	40	24	31	31	314		818	674	722	572
13	131	194	28	25	28	33	311		800	674	722	567
14	131	194	28	26	26	33	139	680	782	668	716	562
15	133	175	28	27	28	36	119		770	668	710	
16	133	50	28	27	28	37	176		740	692	704	562
17	131	41	26	28	28	37	381	622	728	704	698	
18	131	36	28	28	28	31	406	651	722	704	752	
19	139	31	30		31	30	419	746	758	692	920	562
20	139	29	30		36	30	389	866	770	680	955	
21	139	26	30	30	36	30	459	908	764	657	896	
22	144	26	32		40	32	454	962	770	657	887	
23	146	24	33		43	31	478	902	770	668	878	
24	157	24	32		34	31	487	634	758	686		555
25	159	24	33	43	30	30	502	578	752	704		
26	171	25	36		28	29	531	728	752	692	860	
27	174	17	33		30	29	562	692	782	692		
28	171	22	31		29	29	589	728	776	686		
29	171	33	30	40	28	29	606	758	776	686		547
30	171	33	31		.....	29	578	788	758	686	842	545
31	174	.....	32		.....	31	.....	824	.....	686	801	.....

NOTE.—Discharge estimated because of no gage-height record, Nov. 5-9, 26-29, Dec. 3-24, 1918, Jan. 1 to Mar. 29, Apr. 1-3, 5, 8, 18-19, June 4-6, July 6-8, Aug. 18-24, 31, Sept. 1-6, Nov. 1-2, 15, Dec. 7, 1919, Jan. 15-31, Feb. 1, 22, Mar. 27, Apr. 3-8, May 11-16, and Aug. 24 to Sept. 30, 1920. Braced figures show mean discharge for periods indicated.

Monthly discharge of Sevier River at Sevier, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	325	171	230	14,100
November	191	128	155	9,220
December	181	.....	82.5	5,070
January	.....	.....	61.6	3,790
February	.....	.....	65.0	3,410
March	550	.....	129	7,930
April	998	85	436	25,900
May	932	440	663	40,800
June	550	414	492	29,300
July	572	483	510	31,400
August	498	196	350	21,500
September	292	71	170	10,100
The year	998	.....	280	203,000
1919-20.				
October	174	117	141	8,670
November	204	17	91.6	5,450
December	40	17	30.5	1,880
January	.....	23	30.3	1,860
February	43	25	31.3	1,800
March	40	26	31.6	1,940
April	606	33	300	17,900
May	962	547	676	41,600
June	1,170	692	824	49,000
July	752	657	688	42,300
August	955	668	776	47,700
September	.....	.....	595	35,400
The year	1,170	17	352	256,000

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SEVIER RIVER NEAR VERMILION, UTAH.

LOCATION.—In NE. ¼ sec. 19, T. 22 S., R. 1 W., at highway bridge half a mile below Rockyford dam, 2 miles below Vermilion, Sevier County, and 4 miles above mouth of Lost Creek.

DRAINAGE AREA.—3,340 square miles (measured on topographic maps).

RECORDS AVAILABLE.—July 15 to September 23, 1912; July 31, 1914, to September 30, 1920.

GAGE.—Stevens continuous water-stage recorder on right bank; installed April 20, 1917; inspected by Mrs. Will Barron.

DISCHARGE MEASUREMENTS.—Made by wading or from highway bridge.

CHANNEL AND CONTROL.—Fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 6.03 feet at noon April 2 (discharge, 895 second-feet); minimum discharge, 2 second-feet July 6–16 and 26–29.

Maximum stage during year ending September 30, 1920, from water-stage recorder, 4.97 feet at 5 a. m. May 25 (discharge, 360 second-feet); minimum stage from water-stage recorder, 3.10 feet at 7 p. m. May 28 (discharge, 3 second-feet).

1914–1920: Maximum stage recorded, 6.00 feet at 4 p. m. November 25, 1916 (discharge, 941 second-feet); minimum discharge, 2 second-feet in July and August, 1915, and July, 1919.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Entire flow diverted above station during low-water season. Flow past the station at such times represents seepage and return flow from canals.

REGULATION.—Flow past station regulated to a large extent by dams and reservoirs above.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Operation of water-stage recorder satisfactory except November 17, 1918, to January 3, 1919, February 17–24, and August 8–17, 1919. During these periods staff gage was read once a week. Daily discharge ascertained by applying to rating tables the daily mean gage height determined from recorder graph. Discharge estimated for periods of no gage-height record. Records excellent.

Discharge measurements of Sevier River near Vermilion, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Oct. 2	J. J. Sanford	3.84	58.8	Jan. 20	A. B. Purton	4.26	132
Nov. 5	do	4.20	121	June 18	R. R. Rowe	3.59	25.0
				Sept. 13	A. B. Purton	4.19	123
1919.							
Jan. 4	Sanford and Purton	4.20	123				
Apr. 10	A. B. Purton	4.26	134				
Aug. 1	G. H. Russell	4.21	126				
30	do	3.44	15.3				

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Daily discharge, in second-feet, of Sevier River near Vermilion, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	96	123	185		172	165	406	252	5	3	119	52
2	60	123	213	150	180	172	765	234	5	3	43	28
3	57	123			188	182	560	143	5	3	31	28
4	57	123	230	127	190	182	330	74	5	3	29	28
5	63	123		127	190	185	222	41	5	3	28	25
6	106	123	243	127	192	188	216	31	5	2	24	22
7	125	123		123	195	188	228	31	5	3	14	17
8	121	123		125	195	192	210	30	6	2		15
9	119	123		127	201	192	192	30	6	2		14
10	119	123	220	134	201	190	133	29	6	2		11
11	119	123		141	210	185	119	28	6	2		10
12	121	143		143	216	188	115	27	5	2	13	9
13	121	168		150	195	201	106	27	5	2		9
14	121	163	195	152	192	216	190	23	5	2		9
15	121	158		145	192	210	234	18	5	2		9
16	121	158		145	192	204	225	15	5	2		10
17	132			145	180	204	207	10	5	3		11
18	130		195	148	170	210	188	7	5	3	11	13
19	127	153		163	170	204	145	6	5	3	12	13
20	127			170	190	198	91	6	5	3	12	12
21	127			172	170	201	62	6	4	3	12	11
22	127	148	195	172	145	210	50	6	4	3	14	11
23	127	145	195	170	145	198	36	6	4	3	13	10
24	127	165	190	172	145	188	25	7	4	3	13	7
25	125	165		178	145	185	21	11	4	3	13	7
26	125	165	170	178	143	170	16	11	4	2	13	7
27	125			175	158	182	49	7	4	2	17	7
28	125	185		175	168	210	165	5	4	2	15	7
29	123			175	.....	237	237	5	4	2	17	8
30	123		170	175	.....	231	258	5	3	45	15	8
31	123	.....	170	170	.....	306	.....	4	.....	121	31	.....
1919-20.												
1	10	97	118	127	148	103	14	22	4	44	219	237
2	10	99	116	124	148	103	14	41	4	44	228	225
3	11	99	107	122	140	101	19	44	4	44	225	213
4	15	82	120	127	143	101	32	45	4	44	216	158
5	14	74	134	134	143	105	33	59	4	97	210	116
6	13	70	145	140	143	101	38	145	62	127	210	59
7	16	77	152	150	143	97	37	58	290	124	213	29
8	12	56	152	145	140	90	15	38	338	124	216	29
9	23	64	152	138	138	72	15	35	342	122	188	28
10	47	72	162	170	140	74	41	20	318	122	107	27
11	45	90	157	175	140	72	40	21	249	122	107	80
12	42	88	151	162	140	60	18	19	94	122	105	140
13	45	82	145	162	140	56	24	18	5	122	97	109
14	45	84	138	158	136	58	47	70	4	122	60	93
15	41	82	150	155	136	74	58	101	14	122	68	68
16	45	82	138	138	136	79	58	92	20	122	82	56
17	42	82	136	122	134	90	74	84	24	127	99	50
18	41	82	134	129	131	77	79	68	25	134	69	52
19	47	82	140	131	105	68	101	64	25	138	44	50
20	47	82	145	136	97	70	118	74	62	145	156	56
21	49	82	145	145	103	47	116	290	92	152	240	54
22	53	79	131	150	103	47	105	228	92	160	280	53
23	54	77	131	155	101	49	105	237	93	170	298	50
24	59	77	131	158	101	50	42	290	101	180	298	65
25	60	75	127	155	101	46	40	350	150	175	294	70
26	65	74	127	155	97	45	27	294	66	168	290	79
27	70	74	122	150	99	41	23	190	6	170	272	86
28	70	86	122	145	101	38	23	47	6	180	269	109
29	72	122	124	150	101	47	22	5	7	188	272	122
30	77	122	124	150	.....	29	21	4	39	195	272	138
31	92	.....	124	150	.....	16	.....	4	.....	207	255	.....

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Monthly discharge of Sevier River near Vermilion, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	132	57	114	7,010
November	123	.....	148	8,810
December	.....	.....	200	12,300
January	178	123	153	9,410
February	216	143	180	10,000
March	306	165	199	12,200
April	765	16	193	11,500
May	252	4	36.6	2,250
June	6	3	4.8	284
July	121	2	7.7	474
August	119	12	20.2	1,240
September	52	7	14.3	850
The year	765	2	105	76,300
1919–20.				
October	92	10	43.0	2,640
November	122	56	83.1	4,940
December	162	107	135	8,300
January	175	122	145	8,920
February	148	97	125	7,190
March	105	16	67.9	4,180
April	118	14	46.6	2,770
May	350	4	98.6	6,060
June	342	4	84.8	5,050
July	207	44	133	8,180
August	298	44	192	11,800
September	237	27	90.3	5,370
The year	350	4	104	75,400

SEVIER RIVER BELOW SAN PITCH RIVER, NEAR GUNNISON, UTAH.

LOCATION.—In NE. ¼ sec. 14, T. 19 S., R. 1 W., half a mile below former gaging station at bridge on county road from Gunnison to West View precinct, 3 miles west of Gunnison, Sanpete County. San Pitch River enters from east 1,000 feet above station.

DRAINAGE AREA.—4,880 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1917, to September 30, 1920. Records of Sevier River near Gunnison above the confluence of San Pitch River were obtained June 29, 1900, to September 30, 1917. Combined flow of Sevier River near Gunnison with flow of San Pitch River near Gunnison is comparable with flow at present station.

GAGE.—Stevens continuous water-stage recorder on left bank; installed October 4, 1917; inspected by Annetta Kenney.

DISCHARGE MEASUREMENTS.—Made from cable about 250 feet above gage or by wading.

CHANNEL AND CONTROL.—One channel at all stages. Bed is composed of fine sand and gravel. Stage of zero flow about gage height —0.5 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 2.79 feet at 10 a. m. March 25 (discharge, 979 second-feet); minimum stage recorded, 0.19 foot July 30 (discharge, 57 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 3.41 feet at midnight May 22 (discharge, 1,430 second-feet); minimum stage from water-stage recorder, 0.26 foot at 9 a. m. July 15 (discharge, 62 second-feet).

1918–1920: Maximum stage recorded, 3.41 feet at midnight May 22, 1920 (discharge, 1,430 second-feet); minimum stage 0.19 foot July 30, 1919 (discharge, 57 second-feet).

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ICE.—Stage-discharge relation seldom affected by ice.

DIVERSIONS.—During irrigation season, greater part of flow is diverted above station.

REGULATION.—Flow at gage is affected by operation of reservoirs and numerous irrigation diversions above.

ACCURACY.—Stage-discharge relation changed May 22 and September 1, 1919; affected by ice December 14–17, 1919. Rating curves well defined between 60 and 1,000 second-feet. Operation of water-stage recorder satisfactory, except January 2–7, 1919. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Discharge interpolated January 2–7 and December 14–17, 1919. Records good.

Discharge measurements of Sevier River below San Pitch River, near Gunnison, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
1918.				1919.			
Oct. 22	E. A. Porter [a]	1.28	279	Sept. 17	E. A. Porter	0.80	166
1919.				1920.			
Jan. 8	Purton and Sanford	[b] 1.68	292	May 19	Brice McBride [a]	2.01	532
Mar. 25	E. A. Porter	2.77	958	28	do	2.58	854
Apr. 11	do	1.54	365	30	do	2.20	612
26	do	.95	201	June 9	do	2.14	592
May 27	do	.72	156	17	R. R. Rowe	.62	122
June 10	do	.40	85	July 20	Brice McBride	.41	81
July 14	do	.27	68	Aug. 21	do	1.08	226
Aug. 16	do	.45	96	Sept. 13	A. B. Purton	1.20	257

[a] Water commissioner. [b] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Sevier River below San Pitch River, near Gunnison, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	190	265	324	293	324	308	524	367	136	80	152	119
2	217	265	340	291	340	308	560	396	131	81	200	163
3	206	265	357	289	324	324	712	411	117	67	168	168
4	211	265	411	287	308	340	739	374	109	68	119	134
5	217	265	451	284	308	324	524	302	97	67	105	111
6	230	265	431	282	324	324	480	260	89	67	95	94
7	245	278	451	280	324	340	511	219	89	67	91	89
8	255	278	472	278	340	340	451	217	86	65	89	92
9	248	278	431	293	340	340	381	211	83	65	122	94
10	255	278	431	278	357	340	367	200	83	63	219	92
11	255	278	431	308	392	324	357	193	89	63	165	92
12	252	278	392	308	374	324	321	188	86	63	129	89
13	252	293	357	308	340	357	278	165	86	68	117	87
14	265	324	340	308	340	392	278	188	89	73	113	122
15	273	308	340	293	324	374	324	198	87	67	103	117
16	265	308	340	293	324	367	367	209	87	70	92	202
17	265	293	340	293	324	367	364	213	87	78	89	165
18	268	293	340	293	308	404	364	215	94	67	92	134
19	265	293	340	308	308	431	347	200	89	63	94	124
20	265	293	340	324	308	404	318	186	103	63	91	111
21	265	308	340	324	324	485	287	168	95	66	87	101
22	278	308	324	340	308	632	278	154	89	67	86	94
23	265	308	324	324	308	780	275	154	91	68	84	95
24	252	308	308	324	293	920	262	183	87	70	86	86
25	252	308	293	324	293	966	230	165	87	71	91	89
26	252	308	308	324	293	953	202	165	86	74	84	94
27	252	293	308	324	308	933	197	157	75	73	86	94
28	265	308	293	324	308	876	215	154	77	71	86	105
29	265	324	308	308	.....	700	284	146	73	67	84	99
30	278	324	308	324	.....	489	327	139	75	63	80	95
31	265	.....	308	324	.....	493	.....	144	.....	66	80	.....

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Daily discharge, in second-feet, of Sevier River below San Pitch River, near Gunnison, Utah, for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	97	207	255	232	278	243	124	152	863	111	83	334
2	99	217	250	228	284	257	115	165	756	117	94	321
3	105	217	248	226	290	243	117	188	593	111	105	299
4	136	217	248	228	275	228	117	190	476	103	127	281
5	152	207	265	232	268	230	127	197	468	103	139	245
6	149	206	278	239	262	232	122	219	459	101	117	217
7	154	207	273	239	260	226	127	257	480	92	105	188
8	168	217	268	237	257	232	146	232	593	86	105	136
9	165	220	224	211	262	226	134	213	588	75	117	131
10	170	222	193	193	257	222	136	219	542	75	131	144
11	183	232	255	202	260	222	186	230	485	78	160	152
12	183	234	314	230	257	219	173	197	374	80	180	173
13	178	228	273	234	248	219	141	173	250	75	200	257
14	180	228	272	252	248	209	149	215	165	70	204	228
15	180	230	271	248	248	206	211	237	119	66	222	211
16	178	228	271	257	248	217	252	273	111	68	220	193
17	180	228	270	248	245	226	389	350	129	74	217	178
18	178	230	270	255	248	239	569	493	157	78	211	163
19	178	228	245	265	252	232	519	588	127	84	206	163
20	178	222	250	268	260	211	451	815	117	86	206	168
21	173	219	257	268	239	206	435	933	127	75	239	173
22	176	217	250	275	250	202	357	1,240	152	84	311	178
23	178	211	260	287	278	200	252	1,250	163	87	340	188
24	190	213	234	302	257	197	217	1,190	188	87	367	186
25	188	215	228	284	245	188	204	1,180	183	84	378	198
26	188	217	226	273	237	180	193	1,140	202	81	404	215
27	193	204	226	273	234	188	152	1,010	198	87	367	226
28	204	183	228	299	241	193	124	857	122	75	353	234
29	204	232	222	284	239	186	127	722	113	73	340	243
30	207	275	226	284	.....	183	146	658	111	74	347	248
31	204	.....	232	287	.....	157	.....	786	.....	75	337	.....

Monthly discharge of Sevier River below San Pitch River near Gunnison, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	278	190	251	15,400
November	334	265	292	17,400
December	472	293	357	22,000
January	340	.....	305	18,800
February	392	293	334	18,000
March	966	308	492	30,200
April	739	197	371	22,100
May	411	139	214	13,200
June	136	73	91.7	5,460
July	81	63	68.4	4,210
August	219	80	109	6,700
September	202	86	112	6,660
The year	966	63	249	180,000
1919–20.				
October	207	97	171	10,500
November	275	183	220	13,100
December	314	193	251	15,400
January	302	193	253	15,600
February	290	234	256	14,700
March	257	157	214	13,200
April	569	115	217	12,900
May	1,250	152	534	32,800
June	803	111	312	18,600
July	117	66	84.4	5,190
August	404	83	224	13,800
September	334	131	209	12,400
The year	1,250	66	245	178,000

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SEVIER BRIDGE RESERVOIR NEAR JUAB, UTAH.

LOCATION.—In NW. ¼ sec. 1, T. 17 S., R. 2 W., at dam of Consolidated Sevier Bridge Reservoir Co., 13 miles southwest of Juab, Juab County.

RECORDS AVAILABLE.—January 1, 1914, to September 30, 1920.

GAGE.—Inclined staff gage about 100 feet upstream from south end of dam, since April 26, 1914. January 1 to April 25, 1914, elevations of water surface ascertained by measuring depth of water with a rule at a series of bench marks; these readings were checked at intervals with a wye level.

COOPERATION.—Gage-height record furnished by Consolidated Sevier Bridge Reservoir Co.

Daily gage height, in feet, of Sevier Bridge reservoir near Juab, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	32.00	41.20	48.10	55.53	60.40	64.74	69.65	70.15	60.70	46.30	34.30	21.70
2	32.20	41.40	48.40	55.64	60.55	64.89	69.80	70.00	60.50	46.00	33.80	20.90
3	32.50	41.70	48.60	55.75	60.75	65.10	69.95	69.80	60.40	46.00	33.40	20.70
4	32.90	41.90	48.80	55.86	60.95	65.30	70.10	69.60	60.20	45.70	33.10	20.40
5	33.30	42.20	48.90	56.00	61.15	65.50	70.25	69.40	59.90	45.40	32.70	19.90
6	33.70	42.40	49.10	56.20	61.35	65.70	70.40	69.20	59.60	45.00	32.10	19.50
7	34.10	42.60	49.40	56.40	61.55	65.90	70.55	69.00	59.20	44.50	31.40	19.50
8	34.50	42.90	49.70	56.60	61.75	66.10	70.70	68.75	59.00	44.00	30.90	19.20
9	34.80	43.10	49.50	56.80	61.95	66.20	70.85	68.50	59.00	43.50	30.50	18.90
10	35.00	43.30	50.30	57.00	62.10	66.35	71.00	68.20	58.90	43.00	30.00	18.50
11	35.30	43.60	50.50	57.20	62.25	66.50	70.90	67.80	58.70	42.40	29.50	18.10
12	35.60	43.90	50.60	57.40	62.40	66.65	70.90	67.40	58.40	40.80	29.00	17.60
13	35.90	44.20	50.70	57.55	62.55	66.80	71.00	67.10	58.00	40.50	28.80	17.20
14	36.20	44.40	50.80	57.70	62.70	66.95	71.10	66.80	57.50	40.30	28.50	17.20
15	36.50	44.60	51.00	57.85	62.85	67.10	71.20	66.50	57.00	39.90	28.10	17.20
16	36.80	44.80	51.20	58.00	63.00	67.25	71.30	66.10	56.40	39.50	27.70	17.20
17	37.00	45.00	51.40	58.15	63.12	67.40	71.40	65.70	55.90	39.10	27.40	17.20
18	37.40	45.20	51.70	58.30	63.24	67.55	71.56	65.30	55.40	37.70	27.20	17.30
19	37.70	45.40	52.00	58.45	63.36	67.70	71.60	65.00	54.70	37.70	26.90	17.30
20	38.00	45.60	52.30	58.60	63.48	67.85	71.70	64.70	54.00	37.50	26.50	17.30
21	38.30	45.70	52.60	58.75	63.60	68.00	71.50	64.40	53.40	37.30	26.20	17.20
22	38.60	45.80	53.10	58.90	63.72	68.15	71.50	64.10	52.80	37.10	26.00	17.10
23	38.90	45.90	53.40	59.05	63.84	68.30	71.30	63.80	52.20	36.90	25.70	16.60
24	39.20	46.00	53.70	59.20	63.99	68.45	71.20	63.40	51.60	36.70	25.40	16.20
25	39.40	46.30	54.00	59.35	64.14	68.60	71.00	63.00	51.00	36.50	25.10	15.70
26	39.70	46.60	54.30	59.50	64.29	68.75	70.90	62.50	50.40	36.30	24.80	15.20
27	39.90	46.90	54.60	59.65	64.44	68.90	70.80	62.00	49.80	36.10	24.50	14.70
28	40.20	47.20	54.90	59.80	64.59	69.05	70.70	61.60	49.20	35.80	24.10	14.40
29	40.50	47.50	55.20	59.95	.....	69.20	70.50	61.60	48.60	35.50	23.60	14.00
30	40.80	47.80	55.31	60.10	.....	69.35	70.30	61.10	46.90	35.10	23.00	13.70
31	41.00	.....	55.42	60.25	.....	69.50	.....	60.90	.....	34.70	22.30	.....

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Daily gage height, in feet, of Sevier Bridge reservoir near Juab, Utah, for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	14.13	26.71	35.00	40.90	47.50	52.30	56.30	60.00	59.15	49.35	35.80	27.00
2	14.56	27.01	35.20	41.10	47.80	52.50	56.40	60.00	59.15	48.85	35.60	27.00
3	14.99	27.31	35.40	41.30	48.10	52.65	56.50	60.00	59.10	47.85	35.30	27.00
4	15.42	27.61	35.60	41.50	48.30	52.80	56.60	59.90	59.00	47.30	34.90	27.00
5	15.86	27.91	35.90	41.80	48.50	53.00	56.70	59.80	58.80	47.30	34.00	26.90
6	16.20	28.21	36.20	42.00	48.70	53.20	56.80	59.65	58.50	46.65	33.70	26.70
7	16.72	28.51	36.50	42.20	48.90	53.40	56.80	59.50	58.30	46.20	33.40	26.50
8	17.18	28.81	36.70	42.30	49.10	53.50	56.85	59.40	58.20	45.65	33.00	26.30
9	17.64	29.10	36.90	42.40	49.30	53.60	56.90	59.30	58.00	45.10	32.60	26.10
10	18.10	29.40	37.10	42.50	49.40	53.70	57.00	59.10	57.85	44.50	32.10	25.70
11	18.56	29.70	37.30	42.60	49.50	53.80	57.10	58.90	57.60	43.90	31.60	25.30
12	19.01	30.00	37.50	42.70	49.60	53.95	57.20	58.80	57.25	43.40	31.10	24.90
13	19.46	30.30	37.70	42.80	49.70	54.10	57.25	58.60	56.90	43.00	30.70	24.50
14	19.91	30.60	37.90	42.90	49.80	54.20	57.30	58.40	56.40	42.50	30.30	24.20
15	20.26	30.90	38.10	43.00	49.90	54.30	57.40	58.10	55.90	42.00	30.10	23.90
16	20.71	31.20	38.30	43.10	50.00	54.45	57.50	57.80	55.50	41.50	29.90	23.70
17	21.10	31.40	38.50	43.20	50.20	54.60	57.60	57.50	55.15	41.00	29.70	23.50
18	21.61	31.60	38.80	43.50	50.30	54.75	57.75	57.20	54.70	40.50	29.30	23.10
19	22.05	31.90	39.00	43.70	50.40	54.85	57.90	56.90	54.25	40.00	28.90	22.80
20	22.50	32.20	39.20	43.90	50.60	55.00	58.10	58.10	53.75	39.50	28.50	22.50
21	22.95	32.60	39.40	44.20	50.70	55.10	58.30	58.00	53.25	39.00	28.10	22.20
22	23.40	32.90	39.60	44.60	50.80	55.20	58.60	58.00	52.75	38.50	27.70	21.90
23	23.85	33.20	39.80	44.90	50.90	55.35	58.85	58.15	52.30	38.00	27.50	21.60
24	24.30	33.40	40.00	45.20	51.10	55.50	59.10	58.45	51.80	37.50	27.30	21.60
25	24.75	33.60	40.20	45.50	51.30	55.60	59.30	58.75	51.30	37.20	27.10	21.80
26	25.03	33.90	40.30	45.80	51.50	55.70	59.50	58.95	50.65	37.00	27.00	22.10
27	25.31	34.20	40.40	46.10	51.70	55.80	59.60	59.15	50.00	36.80	27.00	22.50
28	25.59	34.40	40.50	46.30	51.90	55.90	59.70	59.30	49.40	36.60	27.00	22.70
29	25.87	34.60	40.60	46.60	52.10	56.00	59.85	59.35	48.75	36.40	27.00	22.90
30	26.15	34.80	40.70	46.90	.....	56.10	60.00	59.30	48.05	36.20	27.00	23.10
31	26.43	.....	40.80	47.20	.....	56.20	.....	59.25	.....	36.00	27.00	.....

SEVIER RIVER NEAR JUAB, UTAH.

LOCATION.—In NE. ¼ sec. 2, T. 17 S., R. 2 W., 1,600 feet downstream from Sevier Bridge dam and 14 miles southwest of Juab, Juab County.

DRAINAGE AREA.—5,120 square miles (measured on topographic maps).

RECORDS AVAILABLE.—September 23, 1911, to September 30, 1920.

GAGE.—Stevens continuous water-stage recorder on left bank; installed April 16, 1914; inspected by H. F. Stout.

DISCHARGE MEASUREMENTS.—Made from cable 600 feet above gage or by wading.

CHANNEL AND CONTROL.—One channel at all stages. Bed composed of sand, clay, and fine gravel. Artificial control of rocks about 40 feet below gage; permanent except during very high stages.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 5.87 feet at 2 p. m. May 15 (discharge, 1,300 second-feet); minimum stage recorded, 1.28 feet during January and February (discharge, 8 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 5.17 feet from 10 p. m. May 19 to 11 a. m. May 22 (discharge, 1,090 second-feet); minimum stage recorded, 1.11 feet January 13–19 (discharge, 1 second-foot).

1911–1920: Maximum stage recorded, 7.8 feet May 28, 29, and June 4–12, 1914 (discharge, 2,030 second-feet); no flow March 7, 1918.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None between this station and that near Gunnison.

REGULATION.—Flow controlled by gates in dam just above station.

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ACCURACY.—Stage-discharge relation changed slightly in September, 1919. Rating curves well defined. Operation of water-stage recorder excellent. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Records good.

COOPERATION.—All discharge measurements during 1919 and 1920 made by water commissioner.

Discharge measurements of Sevier River near Juab, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Apr. 3	F. A. Porter	1.35	11.8	May 19	Brice McBride	5.08	1,030
22	do	4.20	744	27	do	4.06	574
May 2	do	5.08	1,010	30	do	4.40	825
13	do	5.51	1,160	June 7	do	4.50	845
June 4	do	4.07	673	10	do	4.62	857
12	do	3.34	459	July 19	do	4.02	644
24	do	4.83	931	24	do	3.50	506
July 24	do	2.76	304	Aug. 1	do	3.36	415
Aug. 19	do	3.26	443	23	do	3.62	535
Sept. 13	do	2.32	214	Sept. 15	do	2.90	327
26	do	2.86	350				

Daily discharge, in second-feet, of Sevier River near Juab, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	14	8	92	8	8	9	12	1,020	422	781	548	492
2	8	8	131	8	8	9	12	1,020	464	669	520	436
3	8	8	212	8	8	9	12	1,020	506	669	492	367
4	8	8	212	8	8	9	12	1,030	623	717	548	367
5	8	8	32	8	8	9	12	1,080	733	749	638	380
6	8	8	32	8	9	9	14	1,080	901	749	653	380
7	8	8	8	8	9	9	14	1,070	623	765	608	367
8	8	8	8	8	9	9	14	1,070	408	749	578	367
9	8	8	8	8	9	9	16	1,100	422	749	578	380
10	8	8	8	8	9	9	63	1,190	464	781	578	367
11	8	8	8	8	9	9	98	1,170	464	765	578	349
12	8	8	8	8	9	9	22	1,160	478	717	534	310
13	8	8	8	8	9	10	22	1,170	623	701	436	210
14	8	8	9	8	9	10	22	1,230	965	701	436	210
15	8	8	9	8	9	10	22	1,230	914	701	436	210
16	8	8	8	8	9	10	22	1,120	914	685	384	210
17	8	8	8	8	9	10	22	1,190	948	701	367	222
18	8	8	8	8	9	10	22	1,100	1,030	701	408	235
19	8	8	8	8	9	10	22	982	1,020	701	436	235
20	8	8	8	8	9	10	76	948	1,020	520	380	235
21	8	8	8	8	9	11	255	1,100	999	315	302	235
22	8	8	8	8	9	11	685	1,070	965	343	310	310
23	8	8	8	8	9	11	623	1,030	931	332	335	362
24	8	8	8	8	9	11	685	1,120	931	305	332	362
25	8	8	8	8	9	11	685	1,140	948	302	345	362
26	8	8	8	8	9	11	685	1,140	1,020	300	362	349
27	8	8	8	8	9	11	685	1,120	999	332	359	362
28	8	8	8	8	9	11	685	931	999	450	422	362
29	8	8	8	8	.....	11	765	669	982	506	506	323
30	8	56	8	8	.....	11	948	749	948	548	506	176
31	8	.....	8	8	.....	12	.....	548	.....	563	506	.....

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SEVIER RIVER NEAR LYNNDYL, UTAH.

LOCATION.—In SE. ¼ sec. 27, T. 15 S., R. 5 W., at homestead of P. J. Flahive, 3½ miles southwest of Lynndyl, Millard County.

DRAINAGE AREA.—6,270 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 25, 1914, to October 16, 1919, when station was discontinued.

GAGE.—Stevens continuous water-stage recorder on right bank, with inside and outside staff gages, 1½ miles below highway bridge.

DISCHARGE MEASUREMENTS.—Made by wading or from cable a quarter of a mile above gage.

CHANNEL AND CONTROL.—One channel at all stages. Bed composed of fine gravel; control permanent except for very high stages.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 5.51 feet at 6 p. m. May 11 (discharge, 956 second-feet); minimum stage recorded, 1.52 feet April 19–22 (discharge, 20 second-feet).

1914–1919: Maximum discharge recorded, June 9, 1914 (flow estimated 1,820 second-feet); minimum stage 1.52 feet April 19–22, 1919 (discharge, 20 second-feet).

ICE.—Stage-discharge relation affected by ice each winter.

DIVERSIONS.—Numerous diversions above station.

REGULATION.—Flow affected by storage and irrigation diversions above station.

ACCURACY.—Stage-discharge relation changed slightly in May. Two well-defined rating curves used. Operation of water-stage recorder satisfactory, except November 11 to February 8. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Discharge November 11 to February 8 estimated from discharge measurements, weather records, and a few recorded gage heights. Records good.

COOPERATION.—Gage-height record and discharge measurements furnished by Lower Sevier River Water Users.

Discharge measurements of Sevier River near Lynndyl, Utah, during period Oct. 1, 1918, to Oct. 16, 1919.

[Made by E. A. Porter.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1918.	*Feet.*	*Sec.-ft.*	1919.	*Feet.*	*Sec.-ft.*	1919.	*Feet.*	*Sec.-ft.*
Oct. 3	2.33	101	Apr. 15	1.56	22.9	Aug. 21	3.58	388
19	1.78	41.2	30	4.38	639	Oct. 16	1.65	32.6
			June 5	3.00	232			

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Daily discharge, in second-feet, of Sevier River near Lynndyl, Utah, for the period Oct. 1, 1918, to Oct. 16, 1919.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	212	34				23	58	765	425	702	425	452	275
2	172	33	40			23	56	861	275	579	425	640	193
3	101	32				24	58	879	263	452	425	549	122
4	83	32	49			24	56	913	240	425	386	425	77
5	83	32			30	22	56	914	275	425	386	373	49
6	81	32	50			22	49	932	425	465	478	373	45
7	77	32				21	52	916	438	465	506	373	42
8	72	32				21	56	901	412	465	534	360	40
9	71	32	47		26	21	56	918	263	478	534	348	38
10	70	31	46		27	20	38	869	218	465	534	348	36
11	69				27	20	24	937	222	492	534	360	34
12	68				26	20	22	938	222	520	549	335	32
13	65				24	53	24	939	229	520	520	323	32
14	63			40	24	168	25	940	275	549	412	263	31
15	63				24	108	24	924	624	534	399	218	31
16	62				24	70	22	942	624	534	386	214	30
17	56				25	64	22	764	671	549	412	210	.....
18	46	30			25	62	20	844	702	549	386	240	.....
19	41				24	62	20	876	780	549	360	218	.....
20	40		40		24	59	20	876	780	549	386	218	.....
21	39				24	59	20	718	764	492	373	216	.....
22	37				24	59	20	748	764	236	287	218	.....
23	36				24	59	383	764	733	195	252	229	.....
24	36				24	59	492	733	656	203	252	287	.....
25	36				24	58	550	718	671	187	263	323	.....
26	35				24	58	595	733	671	187	275	335	.....
27	35			51	24	55	595	748	718	193	299	335	.....
28	34	32			24	58	595	764	718	197	299	348	.....
29	34		46	30	.....	60	595	876	718	299	299	348	.....
30	34		46		.....	60	610	465	702	348	386	323	.....
31	34	.....	46		.....	59	.....	492	.....	399	425	.....	.....

Monthly discharge of Sevier River near Lynndyl, Utah, for the period Oct. 1, 1918, to Oct. 16, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	212	34	64.0	3,940
November	.....	.....	31.0	1,840
December	.....	.....	42.6	2,620
January	.....	.....	39.1	2,400
February	.....	24	26.1	1,450
March	168	20	50.0	3,070
April	610	20	174	10,400
May	942	465	826	50,800
June	780	218	516	30,700
July	702	187	426	26,200
August	549	252	400	24,600
September	640	210	327	19,500
The year	942	20	215	178,000
1919.				
October 1–16	275	30	69.2	2,200

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SEVIER RIVER NEAR DELTA, UTAH.

LOCATION.—In NW. ¼ sec. 27, T. 16 S., R. 6 W., 1½ miles below Delta spillway and 6½ miles northeast of Delta, Millard County.

DRAINAGE AREA.—7,380 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 16 to September 24, 1912; March 1, 1913, to September 30, 1919, when station was discontinued by United States Geological Survey.

GAGE.—Stevens continuous water-stage recorder on left bank, installed March 24, 1918. Gurley water-stage recorder at same site, March 1, 1913, to January 15, 1918. Inclined staff gage used prior to March 1, 1913.

DISCHARGE MEASUREMENTS.—Made from cable about 100 feet below gage or by wading.

CHANNEL AND CONTROL.—One channel at all stages. Bed composed of firm clay and hardpan. Right bank may be overflowed at extremely high stages.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 2.92 feet at 7 p. m. June 16 (discharge, 525 second-feet); minimum discharge probably occurred in winter when no record was obtained.

1912–1919: Maximum stage recorded, 6.82 feet May 31, 1914 (discharge, 1,470 second-feet); minimum discharge, 15 second-feet July 26, 1914, and November 1, 1916.

ICE.—Stage-discharge relation at times affected by ice.

DIVERSION.—Canal A of the Delta project takes out water 1½ miles above station.

REGULATION.—Flow at station controlled by regulation of Delta spillway and Sevier Bridge reservoir.

ACCURACY.—Stage-discharge relation changed a number of times during the year. Rating curves fairly well defined. Operation of water-stage recorder satisfactory for periods covered by discharge records. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Discharge during winter not determined.

Discharge measurements of Sevier River near Delta, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Jan. 9	L. W. Jordan	0.42	23.0	Nov. 3	E. A. Porter	0.57	50.0
Apr. 13	E. A. Porter[a]	.57	37.5				
25	do	1.86	274	1920.			
May 7	do	2.48	407	June 2	Brice McBride[a]	1.42	180
June 6	do	1.04	98	29	do	1.96	271
26	do	1.12	112	July 27	do	1.29	141
July 11	do	1.78	237	Aug. 17	do	1.36	185
Aug. 20	do	1.18	132	Sept. 14	do	.76	81
Sept. 29	do	1.48	199	25	do	1.10	126
Oct. 20	do	.37	29.7				

[a] Water commissioner.

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Daily discharge, in second-feet, of Sevier River near Delta, Utah, for the year ending Sept. 30, 1919.

Day.	Oct.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	97	90	.....	61	240	92	173	181	201
2	58	70	.....	60	274	131	177	137	165
3	46	45	.....	59	335	116	163	106	151
4	42	44	.....	55	325	82	165	117	123
5	38	43	.....	60	305	77	155	115	88
6	37	42	.....	61	341	88	185	123	88
7	35	49	.....	56	409	111	228	134	105
8	34	48	.....	56	412	119	225	132	125
9	33	47	.....	58	412	127	236	122	117
10	32	43	.....	58	381	88	288	115	122
11	32	40	.....	52	341	74	245	108	120
12	32	38	.....	43	376	131	230	117	113
13	31	37	.....	40	376	175	233	117	91
14	31	35	.....	37	409	204	241	110	57
15	31	33	.....	36	364	283	267	137	51
16	31	30	.....	36	322	425	252	150	48
17	32	27	.....	35	326	288	243	189	46
18	32	.....	.....	34	288	391	239	163	46
19	32	.....	.....	33	283	412	239	153	46
20	31	.....	.....	33	317	464	258	142	46
21	31	.....	.....	31	317	412	272	183	107
22	31	.....	.....	30	283	341	215	195	130
23	31	.....	.....	54	283	295	200	195	120
24	31	.....	.....	190	288	254	240	175	115
25	30	.....	.....	263	267	145	226	175	204
26	29	.....	63	240	293	204	205	185	202
27	28	.....	61	226	317	204	183	195	184
28	28	.....	62	232	322	167	189	203	190
29	27	.....	62	228	300	175	199	199	198
30	27	.....	62	221	267	169	207	219	100
31	26	.....	62	.....	167	.....	189	243	.....

Monthly discharge of Sevier River near Delta, Utah, for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	97	26	35.0	2,150
December 1–17	90	27	44.8	1,510
March 26–31	63	61	62.0	740
April	263	30	89.3	5,310
May	412	167	321	19,700
June	464	74	208	12,400
July	288	155	218	13,400
August	243	106	156	9,590
September	204	46	117	6,960

GUNNISON BEND RESERVOIR NEAR DELTA, UTAH.

LOCATION.—In sec. 15, T. 17 S., R. 7 W., at south end of reservoir, near head of Deseret canal and 2 miles west of Delta, Millard County.

RECORDS AVAILABLE.—Irrigation seasons 1914 to 1919. Station discontinued.

GAGE.—Chain gage established June 19, 1914; readings represent depth of water on gate sill. Depths were measured directly with graduated pole prior to June 19, 1914.

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Daily gage height, in feet, of Gunnison Bend reservoir near Delta, Utah, for the year ending Sept. 30, 1919.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	12.60			8.00			12.30	11.40	12.10	10.10	11.82	11.02
2	12.62		8.00				12.30	11.25	11.98	10.00	11.72	11.28
3		9.80						11.15	11.98	9.82	11.65	11.55
4								11.05	11.95	9.62	11.46	11.82
5								10.85	11.80	9.62	11.30	
6								10.65	11.70	9.55	11.20	
7	12.42							10.60	11.58		11.12	
8							12.20	10.68	11.45	9.82	11.08	11.85
9			7.40					10.72	11.28	10.00	11.02	
10	12.22					10.70		10.85	11.10	10.02	10.90	11.95
11		9.20		7.55				10.88	10.85	10.10	10.82	11.95
12								10.85	10.62	10.08	10.65	
13	11.90								10.40	10.05	10.52	11.90
14								11.05	10.40	10.00	10.42	
15								11.28	10.35	10.01	10.38	
16			8.00				12.10	11.35	10.53	10.15	10.21	11.55
17								11.40	11.15	10.30	10.18	11.40
18		8.45		7.68				11.45	11.46	10.32	10.26	
19						11.20	12.05	11.48	11.85	10.38	10.30	11.03
20	11.15							11.60	11.98	10.40	10.25	
21							11.75	11.60	12.20	10.48	10.15	
22						12.00	11.40	11.58	12.30	10.54		11.00
23			8.20				11.10	11.45		10.70	10.20	11.05
24							11.05	11.32	12.15		10.25	11.10
25		8.00		7.78	10.20	12.55	11.15	11.22	11.95		10.26	11.15
26						12.60	11.20	11.18	11.50	11.30	10.20	
27							11.25	11.20	11.02			11.50
28							11.25	11.35	10.62	11.53	10.30	11.65
29	10.10					12.35	11.42	11.60	10.40	11.65	10.45	
30							11.43	11.85	10.24	11.68	10.60	12.10
31			8.02					12.00		11.78		

SEVIER RIVER AT OASIS, UTAH.

LOCATION.—In E. ½ sec. 33, T. 17 S., R. 7 W., three-quarters of a mile northwest of Oasis, Millard County, and 1½ miles below county bridge locally known as Hinckley Bridge.

DRAINAGE AREA.—8,080 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 13, 1912, to September 30, 1920.

GAGE.—Stevens continuous water-stage recorder on left bank since April 24, 1914; inspected by E. F. Sanders.

DISCHARGE MEASUREMENTS.—Made from county bridge or by wading.

CHANNEL AND CONTROL.—Two channels at extremely high water, one channel at low and medium stages. Bed composed of sand with slight vegetal growth. Control is usually permanent during irrigation season.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 3.88 feet at 12.01 a. m. October 1 (discharge, 196 second-feet); minimum stage from water-stage recorder, 1.55 feet at 9 p. m. April 23 (discharge, 12 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 2.77 feet at 10 p. m. August 27 (discharge, 77 second-feet); minimum stage from water-stage recorder, 1.55 feet at 11 a. m. May 5 (discharge, 12 second-feet).

1912–1920: Maximum stage recorded, 9.45 feet June 12, 1914 (discharge, 1,580 second-feet); minimum discharge recorded, May 13-19, 1912, 0.5 second-foot.

ICE.—Stage-discharge relation at times affected by ice.

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DIVERSIONS.—Numerous diversions above station take practically entire flow during irrigation season; water passing gage at such times is largely seepage or return water entering below Gunnison Bend reservoir.

REGULATION.—Flow controlled by storage reservoirs and diversion dams above station.

ACCURACY.—Stage-discharge relation for low stages changed about April 1, 1919; permanent for stages above 35 second-feet; affected by ice January 6–8 and November 28 to December 2, 1919, and December 9, 1919, to February 27, 1920. Rating curves well defined. Operation of water-stage recorder satisfactory except for periods indicated in footnote to daily-discharge table. Discharge estimated for periods of ice effect. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Records good.

Discharge measurements of Sevier River at Oasis, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 9	L. W. Jordan	2.04	31.6	June 3	Brice McBrides	2.28	41.9
Apr. 14	E. A. Porter [a]	2.31	44.2	Aug. 16	do	1.90	21.0
Aug. 20	do	1.83	22.8				

[a] Water commissioner.

Daily discharge, in second-feet, of Sevier River at Oasis, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	138	32	31	32	36	29	71	19	59	30	27	26
2	57	32	32	32	36	29	71	20	34	32	25	30
3	40	31	32	32	36	29	71	23	25	40	24	32
4	41	31	32	32	36	29	67	22	25	40	24	30
5	38	31	32	32	36	29	62	22	25	32	22	27
6	39	30	32		36	30	55	18	26	30	22	27
7	37	30	32	31	38	29	50	18	26	32	22	27
8	33	29	32		36	28	49	21	26	29	25	28
9	31	29	33	30	36	29	48	21	23	25	23	28
10	31	29	32	32	36	29	47	26	22	27	23	29
11	31	30	32	31	36	29	47	24	21	26	26	32
12	30	30	32	34	37	28	47	24	22	22	25	29
13	29	29	32	32	34	29	46	23	23	23	23	30
14	31	29	32	34	35	29	46	24	23	24	23	30
15	31	29	33	35	36	29	43	23	23	22	24	32
16	30	29	32	34	35	29	37	21	23	22	23	30
17	28	28	32	33	37	29	22	21	25	22	22	27
18	28	29	32	34	36	29	21	20	26	23	24	28
19	27		32	36	36	30	19	19	28	23	23	29
20	26		32	33	36	31	14	23	34	23	23	29
21	28	32	32	36	36	31	15	24	49	24	24	27
22	27		33	34	36	32	15	27	62	28	23	27
23	26		32	36	38	36	15	28	55	30	24	26
24	26	34	32	35	37	36	13	30	45	32	23	27
25	25		32	35	33	51	13	27	42	34	23	26
26	25		32	36	29	77	16	26	42	38	24	27
27	23	33	33	36	29	85	17	24	45	41	24	27
28	23		33	35	29	82	21	23	45	42	25	29
29	26		33	36	.....	78	22	24	42	27	21	31
30	32		33	36	.....	74	21	31	36	22	21	40
31	.....		32	36	.....	73	.....	52	.....	23	23	.....

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Daily discharge, in second-feet, of Sevier River at Oasis, Utah, for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	40	39	35			34	31	13	44	51	58	32
2	35	38	35			32	31	13	43	51	57	30
3	35	38	36			32	31	13	43	53	54	30
4	34	38	36			29	30	13	44	56	36	29
5	32	38	36			30	28	16	42	55	28	27
6	34	38	36			30	28	18	43	60	28	30
7	34	41	36			29	27	18	44	61	30	36
8	32	37	36		25	29	25	19	42	61	29	35
9	31	38				29	26	19	38	58	27	37
10	27	38				29	27	24	39	60	27	36
11	28	36				29	22	20	31	59	28	36
12	29	38				29	17	19	27	54	27	36
13	32	38				29	14	22	28	53	27	38
14	33	35				28	14	40	27	52	27	36
15	35	33				30	14	40	27	53	26	33
16	34	32		20		28	14	39	27	52	25	32
17	34	32				29	15	40	31	53	25	30
18	36	32				29	15	37	34	53	25	31
19	35	33				30	14	44	34	53	28	32
20	36	33	25			30	15	52	34	53	28	32
21	34	36				31	14	60	35	54	27	33
22	34	34			30	31	13	57	40	54	36	35
23	30	34				32	13	49	45	54	41	38
24	33	35				33	13	49	44	54	47	47
25	31	36				33	13	48	44	55	53	43
26	34	38				33	14	47	46	56	60	44
27	32	38				34	14	46	46	55	75	45
28	32	35			34	28	14	46	45	56	35	48
29	33	35			34	32	14	45	45	55	30	48
30	33	35			.....	31	13	44	48	55	30	48
31	35	.....			.....	31	.....	44	.....	57	30	.....

NOTE.—No gage-height record Nov. 19–23 and 25–30, 1918, Oct. 11 and Dec. 9–31, 1919, Mar. 8–11, 17–22, 24–26, 30–31, Apr. 1–3, May 25–29, 31, June 1, 2, July 17–20, and Aug. 12–14, 1920; discharge estimated.

Monthly discharge of Sevier River at Oasis, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	138	23	34.5	2,120
November	.....	28	31.0	1,840
December	33	31	32.2	1,980
January	36	.....	33.6	2,070
February	38	29	35.2	1,950
March	85	28	39.9	2,450
April	71	13	36.7	2,180
May	52	18	24.1	1,480
June	62	21	33.4	1,990
July	42	22	28.6	1,760
August	27	21	23.5	1,440
September	40	26	29.0	1,730
The year	138	13	31.8	23,000
1919–20.				
October	40	27	33.1	2,040
November	41	32	36.0	2,140
December	.....	.....	27.8	1,710
January	.....	.....	20.0	1,230
February	.....	.....	27.7	1,590
March	34	28	30.4	1,850
April	31	13	19.1	1,140
May	60	12	33.9	2,080
June	48	27	38.7	2,300
July	61	51	55.0	3,380
August	75	25	35.6	2,190
September	48	27	36.2	2,150
The year	75	.....	32.8	23,800

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HATCH BENCH CANAL NEAR HATCH, UTAH.

LOCATION.—In NW. ¼ sec. 1, T. 37 S., R. 6 W., half a mile below head of canal, 3½ miles southwest of Hatch, Garfield County, on road to sawmill.

RECORDS AVAILABLE.—May 15, 1914, to October 4, 1919; irrigation seasons only Station discontinued.

GAGE.—Stevens continuous water-stage recorder installed August 7, 1917; inspected by H. S. Barnhurst. Original gage was vertical staff nailed to side of wooden flume just below waste gate. Water-stage recorder installed same location and datum.

DISCHARGE MEASUREMENTS.—Made by wading about 100 feet below gage.

CHANNEL AND CONTROL.—Channel is rectangular flume section, 4 feet wide at gage. Permanent control is afforded by free fall at lower end of flume.

DIVERSIONS.—None; this is the only important diversion from Mammoth Creek above the gaging station, except the one at Panguitch Lake.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve with shifts to parallel curves used for 1919. Operation of water-stage recorder satisfactory, except August 14–16 and September 8–10. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Discharge interpolated August 14–16 and September 8–10. Records good.

Canal diverts water from Mammoth Creek, probably in sec. 3, T. 37 S., R. 6 W. Water is used for irrigation around Hatch.

Discharge measurements of Hatch Bench canal near Hatch, Utah, during the year ending Sept. 30, 1919.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 3	J. J. Sanford	0.54	6.2	July 25	G. H. Russell	1.02	14.2
May 23	G. H. Russell	.95	14.6	Aug. 23	do	.74	7.9
June 8	do	1.02	15.0	Sept. 11	do	.50	4.8
July 7	do	.96	13.7	24	do	.35	1.4

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Daily discharge, in second-feet, of Hatch Bench canal near Hatch, Utah, for the period Oct. 1, 1918, to Oct. 4, 1919.

Day.	Oct.	May.	June.	July.	Aug.	Sept.	Oct.
1	6		23	17	13	9	9
2	6		23	16	12	9	7
3	6		22	16	11	6	5
4			21	14	9	9	4
5			21	14	8	9	
6			20	14	8	8	
7			17	14	9	9	
8			15	13	12	8	
9			13	14	11	7	
10			15	13	11	6	
11			17	13	10	6	
12			17	12	10	11	
13			19	15	9	11	
14			21	13	8	11	
15			20	14	8	12	
16			19	17	8	11	
17			19	16	10	9	
18			21	16	11	9	
19			21	16	8	9	
20			20	14	8	7	
21			20	13	8	6	
22			20	11	8	6	
23		15	20	12	8	3	
24		15	20	15	7	2	
25		16	20	14	6	1	
26		17	20	13	12	1	
27		19	19	13	14	2	
28		20	18	13	13	5	
29		23	18	15	12	6	
30		23	18	15	11	7	
31		24		13	10		

Monthly discharge of Hatch Bench canal near Hatch, Utah, for the period Oct. 1, 1918, to Oct. 4, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 1-3	6	6	6.0	36
May 23-31	24	15	19.1	341
June	23	13	19.2	1,140
July	17	11	14.1	867
August	14	6	9.77	601
September	12	1	7.17	427
October 1-4	9	4	6.25	50

STATE CANAL NEAR PANGUITCH, UTAH.

LOCATION.—In NW. ¼ sec. 2, T. 35 S., R. 5 W., three-quarters of a mile below head of canal and 3½ miles southeast of Panguitch, Garfield County.

RECORDS AVAILABLE.—May 3, 1913, to October 4, 1919; irrigation seasons only. Station discontinued.

GAGE.—Stevens continuous water-stage recorder on right bank at upper end of flume. Gage used May 3 to September 30, 1913, was a vertical staff nailed to right side of flume 15 feet from north or lower end. Zero of gage is grade of flume.

DISCHARGE MEASUREMENTS.—Made from plank across flume or by wading.

CHANNEL AND CONTROL.—Wooden flume section; canal bed above and below flume composed of clean gravel; grade of flume about 0.4 foot below that of canal. Concrete cut-off wall at head of flume serves as control.

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DIVERSIONS.—None above station.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation changed June 1. Rating curves well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Records good.

Records indicate amount of water diverted from Sevier River for the Hatchtown project of the Utah State Land Board. Canal diverts water from Sevier River in sec. 14, T. 35 S., R. 5 W. The water is used for irrigation northeast of Panguitch.

Discharge measurements of State canal near Panguitch, Utah, during the year ending Sept. 30, 1919.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 4	J. J. Sanford	0.64	23.6	July 5	G. H. Russell	0.05	[a] 0.3
May 16	A. B. Purton	.55	19.9	25	do	.21	3.3
June 7	G. H. Russell	.37	8.9	Aug. 6	do	.60	20.7
26	do	.21	3.7				

[a] Discharge estimated.

Daily discharge, in second-feet, of State canal near Panguitch, Utah, for the period May 16 to Oct. 4, 1919.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	May.	June.	July.	Aug.	Sept.	Oct.
1	.....	0	6.3	8.4	3.7	14	16	20	4.0	14	12	5.0	.....
2	.....	0	5.6	17	5.6	14	17	25	4.4	10	11	4.0	.....
3	.....	0	3.9	18	4.0	13	18	38	4.4	14	11	6.6	.....
4	.....	0	2.2	20	4.4	13	19	38	4.4	11	11	11	.....
5	.....	0	.6	21	4.0	.....	20	38	4.4	7.9	10	11	.....
6	.....	0	2.3	21	4.0	.....	21	42	4.4	6.0	10	11	.....
7	.....	5	5.0	23	4.4	.....	22	52	4.4	4.0	10	11	.....
8	.....	24	5.3	9.7	4.4	.....	23	52	4.0	3.4	4.0	11	.....
9	.....	36	5.3	14	4.0	.....	24	52	3.4	3.7	4.0	11	.....
10	.....	39	5.0	28	4.0	.....	25	50	3.7	4.0	3.7	11	.....
11	.....	36	4.7	28	3.7	.....	26	49	4.4	4.0	3.7	11	.....
12	.....	16	4.0	28	3.7	.....	27	48	6.6	3.7	5.3	12	.....
13	.....	3.4	3.2	16	3.7	.....	28	48	6.0	4.0	4.0	12	.....
14	.....	3.4	6.6	15	3.7	.....	29	0	6.0	4.0	3.7	13	.....
15	.....	3.4	16	20	4.0	.....	30	0	6.3	4.7	3.7	13	.....
							31	0	.....	4.0	4.4	.....	.....

Monthly discharge of State canal near Panguitch, Utah, for the period May 16 to Oct. 4, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 16–31	52	0	34.5	1,090
June	39	0	7.90	470
July	16	.6	5.75	354
August	28	3.7	12.9	793
September	13	3.7	7.16	426
October 1–4	14	13	13.5	107
The period				3,240

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LONG CANAL NEAR PANGUITCH, UTAH.

LOCATION.—In W. ½ sec. 2, T. 35 S., R. 5 W., 1¼ miles below head of canal and 3½ miles southeast of Panguitch, Garfield County, on road to Hillsdale.

RECORDS AVAILABLE.—May 8, 1914, to October 4, 1919; irrigation seasons only. Station discontinued.

GAGE.—Stevens continuous water-stage recorder with outside and inside staff gages.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Earth and gravel section. Wooden flume and diversion box just below gage.

DIVERSIONS.—East Bench canal diverts water a few feet below gage.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation variably affected by backwater from headgates of East Bench canal. Rating curve well defined. Standard rating curve used with shifts to parallel curves. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Records fair.

Canal diverts water from Sevier River in sec. 11, T. 35 S., R. 5 W. The water is used for irrigation around Panguitch.

Discharge measurements of Long canal near Panguitch, Utah, during the year ending Sept. 30, 1919.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 4	J. J. Sanford	1.09	39.6	July 5	G. H. Russell	1.13	40.3
May 16	A. B. Purton	1.70	81	26	do	1.19	51
June 7	G. H. Russell	1.24	51	Aug. 6	do	.87	29.0
26	do	1.10	39.4	Sept. 11	do	.90	29.4

Daily discharge, in second-feet, of Long canal near Panguitch, Utah, for the period May 16 to Oct. 4, 1919.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	May.	June.	July.	Aug.	Sept.	Oct.
1	.....	0	38	47	42	32	16	82	40	38	41	30	.....
2	.....	0	20	32	46	31	17	79	40	42	47	28	.....
3	.....	0	0	36	38	31	18	76	40	42	48	27	.....
4	.....	15	29	32	36	31	19	74	38	25	47	26	.....
5	.....	43	50	36	33	.....	20	76	43	26	44	27	.....
6	.....	69	38	36	32	.....	21	77	44	50	44	27	.....
7	.....	58	37	33	30	.....	22	79	45	49	43	26	.....
8	.....	48	38	23	30	.....	23	80	46	49	43	25	.....
9	.....	48	36	22	30	.....	24	82	38	52	43	25	.....
10	.....	48	36	21	30	.....	25	82	38	50	44	25	.....
11	.....	47	38	24	29	.....	26	80	40	47	47	26	.....
12	.....	46	43	34	28	.....	27	76	38	45	50	26	.....
13	.....	45	44	41	28	.....	28	32	39	45	43	28	.....
14	.....	43	36	32	27	.....	29	0	38	48	43	32	.....
15	.....	42	37	24	29	.....	30	0	38	47	41	32	.....
							31	0	.....	42	41	.....	.....

NOTE.—No gage-height record May 20-23, Aug. 21 and 22; discharge estimated.

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Monthly discharge of Long canal near Panguitch, Utah, for the period May 16 to Oct. 4, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 16-31	82	0	60.9	1,920
June	69	0	38.6	2,300
July	52	0	39.2	2,410
August	50	21	28.1	2,340
September	46	25	29.9	1,780
October 1-4	32	31	31.2	248
The period				11,000

EAST PANGUITCH CANAL NEAR PANGUITCH, UTAH.

LOCATION.—In NW. ¼ sec. 34, T. 34 S., R. 5 W., 200 yards below head of canal and ½ mile southeast of Panguitch, Garfield County.

RECORDS AVAILABLE.—May 9, 1914, to October 4, 1919; irrigation seasons only. Station discontinued.

GAGE.—Stevens continuous water-stage recorder on right bank, with inside and outside gages.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Earth section. Concrete weir 15 feet below gage serves as control.

EXTENSIONS.—None above gage.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Operation of water-stage recorder satisfactory except July 30 to August 22. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Discharge July 30 to August 22 estimated with aid of one current-meter measurement. Records good.

Canal diverts water from Sevier River in sec. 34, T. 34 S., R. 5 W. The water is used for irrigation around Panguitch.

Gage measurements of East Panguitch canal near Panguitch, Utah, during the year ending Sept. 30, 1919.

Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
	Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
J. Sanford	0.42	7.6	July 16	G. H. Russell	1.02	31.9
Russell and Purton	1.18	41.8	Aug. 6	do	.74	18.1
G. H. Russell	1.26	47.6	Sept. 3	do	.77	18.1
do	.88	24.1				

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Daily discharge, in second-feet, of East Panguitch canal near Panguitch, Utah, for the period May 16 to Oct. 4, 1919.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	May.	June.	July.	Aug.	Sept.	Oct.
1	.....	0	20		26	15	16	43	21	38		18	.....
2	.....	0	34		28	15	17	43	22	40		16	.....
3	.....	0	37	23	20	14	18	45	21	45		15	.....
4	.....	32	31		19	14	19	44	0	44	22	14	.....
5	.....	43	27		18	.....	20	44	0	42		14	.....
6	.....	49	26	18	18	.....	21	45	0	31		14	.....
7	.....	44	25		18	.....	22	44	0	28		14	.....
8	.....	32	24		17	.....	23	45	0	27	25	13	.....
9	.....	26	24		16	.....	24	46	0	30	26	14	.....
10	.....	24	26		16	.....	25	47	0	31	25	14	.....
11	.....	24	26	22	16	.....	26	47	24	25	21	14	.....
12	.....	24	30		16	.....	27	43	24	24	30	15	.....
13	.....	20	34		15	.....	28	44	22	27	20	16	.....
14	.....	21	37		15	.....	29	0	21	32	21	15	.....
15	.....	20	29		16	.....	30	0	20	30	26	16	.....
							31	0	.....	30	25	.....	.....

Monthly discharge of East Panguitch canal near Panguitch, Utah, for the period, May 16 to Oct. 4, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 16-31	47	0	36.2	1,150
June	49	0	17.8	1,060
July	45	20	30.8	1,890
August	30	.....	22.7	1,400
September	28	13	16.5	982
October 1-4	15	14	14.5	115
The period	.....	.....	.....	6,600

PANGUITCH CREEK ABOVE CANALS, NEAR PANGUITCH, UTAH.

LOCATION.—In SW. ¼ sec. 36, T. 34 S., R. 6 W., above all diversions and 3 miles southwest of Panguitch, Garfield County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 20, 1915, to May 16, 1920, when station was discontinued.

GAGE.—Stevens continuous water-stage recorder on right bank with inside and outside staff gages; inspected by Omer Reid.

DISCHARGE MEASUREMENTS.—Made by wading near gage or from pole bridge 400 feet below gage.

CHANNEL AND CONTROL.—One channel at all stages; control fairly permanent except during high stages.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 2.58 feet at 6 a. m. May 29 (discharge, 180 second-feet); minimum stage 0.55 foot April 29 and 30 (discharge, 6 second-feet).

Maximum stage during period October 1, 1919, to May 16, 1920, from water-stage recorder, 3.09 feet at 3 a. m. May 8 (discharge, 250 second-feet); minimum discharge probably somewhat less than 3 second-feet in November.

1916–1920: Maximum stage from water-stage recorder, 3.75 feet at 10 a. m. June 17, 1917 (discharge, 300 second-feet). Minimum stage recorded, 0.40 foot July 20 and 21, 1918 (discharge, 2 second-feet).

ICE.—Stage-discharge relation affected by ice.

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DIVERSIONS.—Above all diversions from Panguitch Creek. Water is diverted from Mammoth Creek to the headwaters of Panguitch Creek for storage in Panguitch Lake.

REGULATION.—Flow regulated by storage in Panguitch Lake.

ACCURACY.—Stage-discharge relation permanent except as affected by ice November 27, 1919, to February 28, 1920. Rating curve well defined. Operation of water-stage recorder frequently unsatisfactory for short periods. Staff gage read once a week. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Discharge estimated for periods when recorder was not in operation. Records good for periods covered by daily determinations of discharge; fair for periods estimated.

Discharge measurements of Panguitch Creek above canals, near Panguitch, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 4	J. J. Sanford	0.78	19.5	July 17	G. H. Russell	1.57	69
				Aug. 6	do	.61	8.5
1919.				Sept. 2	do	.84	20.0
Apr. 6	A. B. Purton	.99	27.0	11	do	.62	8.6
May 17	Russell and Purton	1.48	63				
June 7	G. H. Russell	1.60	68	1920.			
26	do	1.57	71	Jan. 19	A. B. Purton	.60	8.2
July 5	do	1.63	73				

Daily discharge, in second-feet, of Panguitch Creek above canals, near Panguitch, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1919.							1919.						
1				71	45	18	17	64	62	71	70	29	8
2			10	76	8	19	18	70	68	70	62	30	7
3				74	8	21	19	63	67	70	57	24	7
4				74	8	20	20	77	64	69	56	23	7
5			54	73	8	20	21	79	64	68	54	22	7
6	35		68	72	8	19	22	66	64	72	53	20	7
7	24		70	71	8	19	23	57	66	71	53	16	7
8	26	10	69	69	11	18	24	57	68	69	56	20	7
9	19		70	67	12	18	25	57	68	69	53	18	7
10	13		68	66	17	12	26	54	68	69	46	19	7
11	29		68	66	22	9	27	40	64	70	44	20	8
12	39		66		25	7	28	8	71	70	43	20	9
13	39		64		27	8	29	6	114	69	45	18	9
14	55		72	68	33	7	30	6	14	69	43	17	9
15	46		73		30	7	31		10		42	17	
16	44	30	72		29	9							

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Daily discharge, in second-feet, of Panguitch Creek above canals, near Panguitch, Utah, for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.
1919-20.								
1	9	7					12	99
2	8	7					13	101
3	8	9					12	168
4	8	10				9	11	97
5	8	11			10		13	96
6	8	12					16	134
7	8	14				8	23	180
8	8	14			10		27	168
9	8	14					29	139
10	8	16		8			27	104
11	8	13				10	23	84
12	8	12					26	86
13	8	10					33	82
14	8	9				19	33	78
15	8	9					22	74
16	8	8	5					70
17	8	8				18		.....
18	7	7						.....
19	7	7		8	10			.....
20	7	7					22	.....
21	7	6				16		.....
22	7	5				16		.....
23	6	5				16		.....
24	6	4				14		.....
25	6	3		8		14	22	.....
26	6	3				12	23	.....
27	6					11	30	.....
28	6	3				12	49	.....
29	7				10	11	73	.....
30	7				.....	12	99	.....
31	7	.....			.....	12	.....	.....

NOTE.—Braced figures show mean discharge for periods indicated.

Monthly discharge of Panguitch Creek above canals, near Panguitch, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919.				
April 6-30	79	6	42.9	2,130
May	114	.....	35.9	2,210
June	73	.....	61.0	3,630
July	76	42	61.2	3,760
August	45	8	19.7	1,210
September	21	7	11.2	666
The period	.....	.....	.....	13,600
1919-20.				
October	9	6	7.4	455
November	16	.....	8.1	482
December	.....	.....	5.0	307
January	.....	.....	8.0	492
February	.....	.....	10.0	575
March	.....	.....	12.7	781
April	99	11	27.1	1,610
May 1-16	180	70	106	3,370
The period	.....	.....	.....	8,070

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BARTON AND LE FEVRE CANAL NEAR PANGUITCH, UTAH.

LOCATION.—In sec. 9, T. 34 S., R. 5 W., 400 feet below head of canal, just below mouth of Threemile Creek, and 3½ miles north of Panguitch, Garfield County.

RECORDS AVAILABLE.—May 16, 1915, to September 30, 1919; irrigation seasons only; miscellaneous measurements during 1914. Station discontinued.

GAGE.—Vertical staff on left bank; read by Zera Church.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Earth section; shifting control.

ACCURACY.—Stage-discharge relation changed June 8, 1919. Rating curves well defined. Staff gage read to hundredths once a day, except June 5–7, August 31 to September 6, and days when canal was empty. Daily discharge ascertained by applying daily gage height to rating table. Discharge estimated May 18–23, and August 31 to September 6; interpolated, June 5–7. Records fair.

This canal diverts from Sevier River on left side, in sec. 9, T. 34 S., R. 5 W. Water used for irrigation.

Discharge measurements of Barton and Le Fevre canal near Panguitch, Utah, during the year ending Sept. 30, 1919.

[Made by G. H. Russell.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 16	0.34	10.8	June 8	[a] 0.40	2.9	Aug 5	0.71	6.7
17	.20	7.6	27	.50	3.5	22	.35	2.6
24	.20	5.2	July 17	.79	8.2	Sept. 3	.05	4.6
						23	.65	5.2

[a] Gage reset to independent datum.

Daily discharge, in second-feet, of Barton and Le Fevre canal near Panguitch, Utah, for the year ending Sept. 30, 1919.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1		4	6	8		16	11	4	4	0	0
2		4	7	6		17	8	6	8	0	0
3		4	0	7		18		6	7	0	0
4		4	4	7	0.5	19		5	6	0	6
5		4	6	6		20		6	8	0	6
6		3	6	6		21	6	6	6	0	6
7		3	5	0	0	22		5	6	2	6
8		3	6	0	0	23		6	5	2	6
9		2	6	0	0	24	5	0	11	3	6
10		2	6	0	0	25	4	4	0	2	6
11		1	6	0	0	26	4	4	0	3	6
12		1	6	0	0	27	4	3	8	7	6
13		4	6	0	0	28	4	3	9	6	6
14		4	0	0	0	29	0	5	9	4	6
15		4	0	0	0	30	0	5	7	5	6
						31	4		7	1	

Monthly discharge of Barton and Le Fevre canal near Panguitch, Utah, for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 16–31	11	0	5.0	180
June	6	0	3.8	228
July	11	0	5.5	339
August	8	0	2.4	149
September	6	0	2.5	149
period				1,020

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McEWEN CANAL NEAR PANGUITCH, UTAH.

LOCATION.—Near line between secs. 4 and 9, T. 34 S., R. 5 W., 100 feet below head of canal, just below mouth of Threemile Creek, and 3½ miles north of Panguitch, Garfield County.

RECORDS AVAILABLE.—May 9, 1914, to October 3, 1919; irrigation seasons only. Station discontinued.

GAGE.—Stevens continuous water-stage recorder, with outside and inside staff gages since May, 1915; inspected by Esta Orton. Stevens continuous water-stage recorder at same site May 9 to May 25, 1914, when it was washed out by flood from Hatchtown reservoir. Temporary vertical staff on left bank, 100 feet from head of canal used July 2, 1914, to May 19, 1915.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed composed of clay; fairly permanent.

DIVERSIONS.—None above gage.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation permanent except for backwater from temporary dam May 29 and May 31 to June 16. Rating curves well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Records good.

Canal diverts water from Sevier River, in NW. ¼ sec. 9, T. 34 S., R. 5 W. Water is used for irrigation below Panguitch, on ranch of A. A. Church.

Discharge measurements of McEwen canal near Panguitch, Utah, during the year ending Sept 30, 1919.

[Made by G. H. Russell.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 16	1.45	26.7	June 27	1.25	17.6	Aug. 22	1.00	9.0
24	1.56	31.5	July 17	.72	2.4	Sept. 3	1.29	18.6
June 8	1.40	14.9	Aug. 5	1.28	17.6	23	1.29	17.5

Daily discharge, in second-feet, of McEwen canal near Panguitch, Utah, for the period May 23 to Oct. 3, 1919.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	May.	June.	July.	Aug.	Sept.	Oct.
1	.....	27	17	20	15	19	16	.....	15	14	12	20	.....
2	.....	26	19	20	20	20	17	.....	14	4	13	19	.....
3	.....	24	21	19	19	20	18	.....	14	25	13	19	.....
4	.....	23	17	19	19	.....	19	.....	14	26	12	19	.....
5	.....	18	16	18	18	.....	20	.....	14	26	10	19	.....
6	.....	18	16	18	18	.....	21	.....	13	18	9	19	.....
7	.....	15	16	20	18	.....	22	.....	8	17	9	19	.....
8	.....	18	16	14	18	.....	23	36	13	17	9	19	.....
9	.....	14	16	12	18	.....	24	36	13	19	6	19	.....
10	.....	13	16	11	18	.....	25	32	14	23	9	19	.....
11	.....	12	17	15	18	.....	26	32	18	23	15	19	.....
12	.....	13	17	13	18	.....	27	26	17	18	17	19	.....
13	.....	22	19	11	18	.....	28	26	17	19	16	19	.....
14	.....	21	24	11	18	.....	29	33	17	20	16	19	.....
15	.....	20	20	12	19	.....	30	28	17	20	15	19	.....
							31	26	.....	18	15	.....	.....

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Monthly discharge of McEwen canal near Panguitch, Utah, for the period May 23 to Oct. 3, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 23–31	36	23	30.0	535
June	27	8	16.7	994
July	26	4	18.5	1,140
August	20	6	13.8	848
September	20	15	18.6	1,110
October 1–3	20	19	19.7	117
The period				4,740

OLD HOUSTON CANAL NEAR PANGUITCH, UTAH.

LOCATION.—In SW. ¼ sec. 4, T. 34 S., R. 5 W., at Church ranch, half a mile below mouth of Threemile Creek and 3½ miles southeast of Panguitch, Garfield County.

RECORDS AVAILABLE.—June 1, 1915, to July 27, 1919; irrigation seasons only; some miscellaneous measurements during 1914. Station discontinued.

GAGE.—Vertical staff; read by Zella Beckstrom.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Shifting gravel and clay.

ACCURACY.—Stage-discharge relation not permanent. Gage read to hundredths once a day. Daily discharge not determined, as insufficient current-meter measurements were made for defining rating curve.

Canal diverts water from Sevier River for irrigation.

Discharge measurements of Old Houston canal near Panguitch, Utah, during the year ending Sept. 30, 1919.

[Made by G. H. Russell.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
May 24	1.70	3.5
June 27	1.54	2.6
July 17	1.33	.5

Daily gage height, in feet, of Old Houston canal near Panguitch, Utah, for the year ending Sept. 30, 1919.

Day.	May.	June.	July.	Day.	May.	June.	July.	Day.	May.	June.	July.
1			1.42	11		1.50	1.64	21	1.40	1.60	1.76
2			1.50	12		1.50	1.76	22	1.40	1.40	1.74
3			1.84	13		1.80	1.74	23	1.40	1.74	1.70
4			1.50	14		1.74	1.94	24	1.70	1.66	1.74
5			1.46	15		1.70	1.92	25	1.66	1.46	1.90
6		1.70	1.40	16		1.60		26	1.56	1.54	1.80
7		1.70	1.54	17		1.64		27	1.34	1.50	1.88
8			1.64	18		1.71	1.90	28	1.34	1.50	
9			1.62	19		1.68	1.80	29		1.50	
10		1.40	1.62	20	1.55	1.60	1.80	30		1.46	
								31			

NOTE.—Canal dry May 29 to June 5, June 8 and 9.

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FOX CANAL NEAR CIRCLEVILLE, UTAH.

LOCATION.—In SE. ¼ sec. 3, T. 31 S., R. 4 W., 300 feet below head of canal and 3½ miles southwest of Fullmer store in Circleville, Piute County.

RECORDS AVAILABLE.—May 14, 1914, to September 30, 1919; irrigation seasons only. Station discontinued.

GAGE.—Stevens continuous water-stage recorder on left bank, with inside and outside staff gages.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Earth section. Wooden flume with removable crest board just below gage forms control.

DIVERSIONS.—None from canal above gage.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation permanent, except for backwater from flashboards in weir on May 20–28, June 10–12, and June 18 to August 6. Rating curves fairly well defined. Operation of water-stage recorder satisfactory except May 31, June 10–12, August 7–15, and 20–22. Staff gage read August 11. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Discharge estimated May 21–28 and for days of faulty gage-height record. Records fair.

Canal diverts water from right bank of Sevier River, in sec. 3, T. 31 S., R. 4 W. Water is used for irrigation around Circleville.

Discharge measurements of Fox canal near Circleville, Utah, during the year ending Sept. 30, 1919.

[Made by G. H. Russell.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 15	1.34	30.3	July 17	[a] 1.83	13.6	Sept. 3	0.97	16.9
June 2	1.58	39.6	Aug. 17	.87	14.8	23	.96	17.4
20	[a] 1.40	5.9						

[a] Backwater caused by flashboard in weir.

Daily discharge, in second-feet, of Fox canal near Circleville, Utah, for the year ending Sept. 30, 1919.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	.....	39	6	17	9	16	36	6	17	11	17
2	.....	39	10	25	14	17	31	6	14	15	16
3	.....	39	9	17	18	18	24	6	19	13	16
4	.....	36	9	16	18	19	22	6	15	11	16
5	.....	32	6	15	16	20	12	6	15	10	17
6	.....	24	6	14	15	21	8	6	14	9	16
7	.....	20	5	15	13	22	8	6	11	8	17
8	.....	17	5	16	13	23	8	6	10	8	17
9	.....	13	5	18	14	24	8	6	10	8	17
10	.....	7	5	20	14	25	9	6	11	9	17
11	.....	6	6	22	14	26	8	5	11	8	18
12	.....	6	7	20	14	27	8	5	10	8	18
13	.....	6	8	18	14	28	8	5	10	9	18
14	.....	7	15	16	14	29	32	5	11	8	19
15	31	6	16	14	14	30	32	5	13	8	18
						31	36	.....	13	8	.....

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Monthly discharge of Fox canal near Circleville, Utah, for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 15–31	36	8	18.9	633
June	39	5	12.7	756
July	19	5	10.4	640
August	26	8	13.4	824
September	19	9	15.7	934
The period				3,792

CIRCLEVILLE CANAL NEAR CIRCLEVILLE, UTAH.

LOCATION.—In NE. ¼ sec. 3, T. 31 S., R. 4 W., three-quarters of a mile below head of canal and 3 miles southwest of Fullmer store in Circleville, Piute County.

RECORDS AVAILABLE.—May 14, 1914, to October 4, 1919; irrigation seasons only. Station discontinued.

GAGE.—Stevens continuous water-stage recorder, with inside and outside vertical staff gages.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Earth section. Wooden weir 3 feet below gage serves as control.

DIVERSIONS.—Above all diversions from the canal.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Operation of water-stage recorder satisfactory except May 19–23 and 26–31. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Discharge estimated May 19–23 and 26–31. Records good.

Canal diverts water from left bank of Sevier River in sec. 3, T. 31 S., R. 4 W., a short distance below head of Fox canal. Water is used for irrigation around Circleville.

Discharge measurements of Circleville canal near Circleville, Utah, during the year ending Sept. 30, 1919.

[Made by G. H. Russell.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 15	1.70	42.3	July 8	1.08	15.4	Aug. 16	1.39	27.0
June 2	1.92	51	27	1.10	16.8	Sept. 10	1.38	24.7
20	1.18	18.8						

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Daily discharge, in second-feet, of Circleville canal near Circleville, Utah, for the period May 15 to Oct. 4, 1919.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	May.	June.	July.	Aug.	Sept.	Oct.
1	.....	37	18	24	19	25	16	42	15	30	26	24	.....
2	.....	52	21	36	23	26	17	38	15	26	28	24	.....
3	.....	37	23	31	24	21	18	41	19	34	26	25	.....
4	.....	36	23	33	23	16	19		18	28	24	25	.....
5	.....	30	23	31	20	.....	20		19	27	22	25	.....
6	.....	30	20	30	21	.....	21	30	19	29	22	25	.....
7	.....	30	18	30	22	.....	22		19	29	22	25	.....
8	.....	27	16	41	25	.....	23		19	23	21	26	.....
9	.....	24	16	26	25	.....	24	21	19	17	21	26	.....
10	.....	21	16	30	26	.....	25	20	19	18	21	26	.....
11	.....	20	20	27	29	.....	26		19	20	19	26	.....
12	.....	17	21	25	24	.....	27		17	16	17	26	.....
13	.....	14	21	25	23	.....	28	28	16	17	17	25	.....
14	.....	14	28	24	22	.....	29		18	21	17	25	.....
15	41	14	31	24	24	.....	30		18	22	18	25	.....
							31		.....	19	18	.....	.....

Monthly discharge of Circleville canal near Circleville, Utah, for the period May 15 to Oct. 4, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 15-31	42	.....	30.6	1,040
June	52	14	22.4	1,330
July	34	16	22.3	1,370
August	41	17	25.0	1,540
September	29	19	24.2	1,440
Oct. 1-4	26	16	22.0	175
The period	.....	.....	.....	6,900

OLD KINGSTON CANAL NEAR CIRCLEVILLE, UTAH.

LOCATION.—In SW. ¼ sec. 35, T. 30 S., R. 4 W., 200 yards below head of canal and 2 miles southwest of Fullmer store in Circleville, Piute County.

RECORDS AVAILABLE.—May 14, 1914, to September 30, 1919; irrigation seasons only. Station discontinued.

GAGE.—Stevens continuous water-stage recorder on left bank with inside and outside staff gages; inspected by J. P. Meeks.

DISCHARGE MEASUREMENTS.—Made by wading 50 feet above gage.

CHANNEL AND CONTROL.—Earth section. Crest of wooden weir just below gage serves as control.

DIVERSIONS.—Above all diversions.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation permanent after June 19. Rating curve well defined. Operation of water-stage recorder fairly satisfactory except June 9–19. Staff gage read June 15. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Shifting-control method used May 16 to June 19. Discharge interpolated June 9–14 and 16–19. Records fair.

Canal diverts water from right bank of Sevier River in SW. ¼ sec. 35, T. 30 S., R. 4 W. Water is used for irrigation around Circleville.

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Discharge measurements of Old Kingston canal near Circleville, Utah, during the year ending Sept. 30, 1919.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 15	A. B. Purton	0.84	25.3	July 17	G. H. Russell	0.85	23.6
June 2	G. H. Russell	1.04	31.4	Aug. 16	do	.76	17.3
20	do	.83	20.8	Sept. 10	do	.83	19.9

Daily discharge, in second-feet, of Old Kingston canal near Circleville, Utah, for the year ending Sept. 30, 1919.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1		90	21	25	15	16	26	17	28	19	26
2		33	33	34	18	17	56	18	23	18	26
3		62	27	31	23	18	57	19	38	18	25
4		90	24	23	24	19	47	20	28	17	26
5		75	23	21	23	20	45	21	23	16	25
6		56	23	20	21	21	43	20	25	14	25
7		44	20	20	19	22	39	19	22	14	25
8		33	18	45	19	23	40	20	21	14	24
9			18	31	19	24	36	21	18	13	26
10			18	24	20	25	33	20	20	13	29
11		24	16	20	19	26	33	19	20	13	36
12			19	20	21	27	28	19	20	13	37
13			20	20	21	28	36	19	18	14	38
14			25	20	21	29	83	19	18	14	38
15	23	16	24	20	21	30	82	20	18	14	38
						31	84		20	14	

Monthly discharge of Old Kingston canal near Circleville, Utah, for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 15–31	84	23	46.5	1,570
June	90		31.1	1,850
July	38	16	22.2	1,360
August	45	13	19.7	1,210
September	38	15	24.9	1,480
The period				7,470

DALTON CANAL AT CIRCLEVILLE, UTAH.

LOCATION.—In SW. ¼ sec. 25, T. 30 S., R. 4 W., 800 feet below canal heading and a quarter of a mile southeast of Fullmer store in Circleville, Piute County.

RECORDS AVAILABLE.—July 1, 1914, to September 30, 1919; irrigation seasons only. Station discontinued.

GAGE.—Vertical staff on right bank 100 feet below spillway; read by J. P. Meeks.

DISCHARGE MEASUREMENTS.—Made by wading or from pole bridge.

CHANNEL AND CONTROL.—Earth section. Row of stakes driven into canal bed just below gage serves as control at low stages.

DIVERSIONS.—None above gage.

REGULATION.—Flow controlled by head gates.

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ACCURACY.—Stage-discharge relation changed frequently. Rating curves fairly well defined. Staff gage read to hundredths once a day. Daily discharge determined by applying daily gage height to rating table. Records fair.

Canal diverts water from left bank of Sevier River in sec. 35, T. 30 S., R. 4 W. Water is used for irrigation in and below Circleville.

Discharge measurements of Dalton canal at Circleville, Utah, during the year ending Sept. 30, 1919.

[Made by G. H. Russell.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 15	0.54	0.8	July 8	1.00	4.9	Aug. 17	0.97	8.1
June 2	2.26	30.5	27	.88	6.7	Sept. 10	.91	5.7
20	1.09	9.8						

Daily discharge, in second-feet, of Dalton canal at Circleville, Utah, for the year ending Sept. 30, 1919.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	.....	25	6	19	6	16	2	11	15	8	7
2	.....	31	6	22	8	17	4	13	6	8	7
3	.....	20	7	16	6	18	6	17	8	6	7
4	.....	14	6	9	6	19	10	11	6	9	7
5	.....	10	5	7	9	20	13	10	10	7	7
6	.....	9	7	6	8	21	14	5	9	7	7
7	.....	9	6	6	5	22	9	7	6	7	5
8	.....	8	5	9	6	23	11	7	7	7	6
9	.....	9	4	6	13	24	8	9	7	7	7
10	.....	6	8	5	7	25	8	7	6	7	5
11	.....	7	5	4	5	26	7	6	10	8	4
12	.....	9	8	10	5	27	7	5	6	6	6
13	.....	9	4	7	7	28	7	7	8	9	
14	.....	10	7	10	6	29	18	5	6	13	5
15	1	11	7	10	6	30	33	6	5	13	
						31	30	.....	9	6	.....

Monthly discharge of Dalton canal at Circleville, Utah, for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 15-31	33	1	11.1	373
June	31	5	10.4	619
July	15	4	6.9	424
August	22	4	8.8	541
September	13	4	6.4	381
The period	.....	.....	.....	2,340

MITCHELL SLOUGH CANAL NEAR JUNCTION, UTAH.

LOCATION.—In NE. ¼ sec. 17, T. 30 S., R. 3 W., several miles below head of canal and 2½ miles south of Junction, Piute County.

RECORDS AVAILABLE.—May 15, 1914, to October 3, 1919; irrigation seasons only. Station discontinued.

GAGE.—Stevens continuous water-stage recorder, with outside and inside gages.

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DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Earth section. Concrete weir just below gage serves as control.

DIVERSIONS.—None above gage.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation permanent during 1919 except for slight backwater August 17–20. Rating curve well defined. Operation of water-stage recorder satisfactory except May 16–23, August 10–16, and September 18–21. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Records good.

Canal diverts water from Mitchell Slough, probably in sec. 19, T. 30 S., R. 3 W. Water is used for irrigation above Junction.

Discharge measurements of Mitchell Slough canal near Junction, Utah, during the year ending Sept. 30, 1919.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 15	Russell and Purton	0.73	14.2	Aug. 17	G. H. Russell	0.58	7.1
June 1	G. H. Russell	.63	9.6	Sept. 4	do	.67	12.1
20	do	.57	7.5	22	do	.57	8.0
July 18	do	.54	7.2				

Daily discharge, in second-feet, of Mitchell Slough canal near Junction, Utah, for the period May 15 to Oct. 3, 1919.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	May.	June.	July.	Aug.	Sept.	Oct.
1	.....	10	8	6	10	7	16	14	9	7	7	7	.....
2	.....	11	8	6	10	8	17	13	9	7	6	7	.....
3	.....	11	9	6	14	10	18	12	9	7	6	7	.....
4	.....	10	8	6	12	.....	19	12	9	7	6	7	.....
5	.....	11	8	6	10	.....	20	11	8	7	6	8	.....
6	.....	17	8	7	8	.....	21	11	8	7	6	8	.....
7	.....	17	8	7	8	.....	22	10	8	7	6	8	.....
8	.....	17	7	10	8	.....	23	10	8	7	6	8	.....
9	.....	15	7	12	8	.....	24	9	8	7	6	8	.....
10	.....	12	7	11	9	.....	25	9	8	7	6	9	.....
11	.....	10	8	10	8	.....	26	8	8	6	6	10	.....
12	.....	9	8	10	8	.....	27	8	8	6	6	9	.....
13	.....	9	7	9	8	.....	28	7	8	6	6	10	.....
14	.....	9	7	8	7	.....	29	8	8	6	8	9	.....
15	14	9	7	8	7	.....	30	9	8	6	10	9	.....
							31	10	.....	6	10	.....	.....

NOTE.—Discharge, May 16–23, Aug. 10–16, and Sept. 18–21, interpolated.

Monthly discharge of Mitchell Slough canal near Junction, Utah, for the period May 15 to Oct. 3, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 15–31	14	7	10.3	347
June	17	8	10.0	595
July	9	6	7.1	437
[illegible]gust	12	6	7.4	455
[illegible]tember	14	7	8.6	512
[illegible]ber 1–3	10	7	8.3	50
The period				2,400

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JUNCTION MIDDLE CANAL NEAR JUNCTION, UTAH.

LOCATION.—In NW. ¼ sec. 16, T. 30 S., R. 3 W., 1,000 feet due east of Piute County cheese factory and 800 feet below head of canal that diverts from Sevier River 2¼ miles southest of Junction, Piute County.

RECORDS AVAILABLE.—May 17, 1915, to September 30. 1919; irrigation seasons only; some miscellaneous measurements during 1914. Station discontinued.

GAGE.—Vertical enamel gage nailed to upstream wing of old wooden flume; read by John T. Luke.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Earth section. No permanent control. The Barnson spring flows into the canal about 150 feet below the gage and at times a diversion dam is placed across canal just below spring.

DIVERSIONS.—Above all diversions from canal.

ACCURACY.—Stage-discharge relation not permanent because of accumulation of silt and vegetation in channel below gage, and because of backwater from check for lateral a short distance below. Rating curves fairly well defined. Gage read to hundredths once a day. Daily discharge determined by applying daily gage height to rating table. Records fair.

Discharge measurements of Junction Middle canal near Junction, Utah, during the year ending Sept. 30, 1919.

[Made by G. H. Russell.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
June 1	3.40	0.7	July 9	3.90	5.1	Aug. 17	4.07	3.4
20	3.96	5.4	18	4.16	6.2	25	3.50	1.6
						Sept. 4	3.36	.5

Daily discharge, in second-feet, of Junction Middle canal near Junction, Utah, for the year ending Sept. 30, 1919.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1		1	6	8	1	16		8	6	7	
2		2	7	7	1	17		8	6	8	
3		0	6	7	1	18		6	6	8	
4		3	5	6	1	19		5	6	7	
5		10	4	6	1	20		6	5	6	0
6		8	4	6	1	21		5	5	3	
7		8	5	6		22		6	4	3	
8		8	4	12		23	0	6	4	3	
9		7	5	9		24		5	5	2	
10		7	5	10		25		5	5	2	4
11		6	4	9	0	26		5	6	2	3
12		19	5	9		27		5	5	1	2
13		9	5	7		28		5	4	1	2
14		8	5	5		29	6	5	3	1	2
15		8	5	6		30	6	6	8	1	1
						31	2		8	1	

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Monthly discharge of Junction Middle canal near Junction, Utah, for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 18-31	6	0	1.0	26
June	19	0	6.3	377
July	8	3	5.2	320
August	13	1	5.5	338
September	4	0	.7	42
The period				1,100

EAST FORK OF SEVIER RIVER AT COYOTO, UTAH.

LOCATION.—In NW. ¼ sec. 15, T. 31 S., R. 2 W., immediately below mouth of Coyoto Creek, half a mile below diversion to Otter Creek reservoir, and half a mile southeast of schoolhouse at Coyoto, Garfield County.

RECORDS AVAILABLE.—December 7, 1914, to August 15, 1915; August 1, 1916, to August 25, 1919, when station was discontinued. October 28, 1915, to August 31, 1916, a station was maintained about 4 miles below, but the flow is not comparable at these two points owing to return flow between the stations.

GAGE.—Vertical staff fastened to post on right bank; installed July 15, 1918, read by Elmer Black. Vertical staff on right bank 150 feet above present gage March 12 to August 15, 1915, and July 30, 1916, to May 12, 1917. Original gage vertical staff on left bank fastened to old bridge abutment just above present gage, at different datum.

DISCHARGE MEASUREMENTS.—Made by wading near station.

CHANNEL AND CONTROL.—One channel at all stages. Bed composed of sand and gravel; shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period in 1919, 2.30 feet at 8.45 p. m. Aug. 16 (discharge, estimated 127 second-feet); minimum stage 1.00 foot May 24 (discharge, 2 second-feet).

DIVERSIONS.—Canals divert for irrigation and storage above the station.

REGULATION.—None, other than that caused by diversions mentioned above.

ACCURACY.—Stage-discharge relation permanent during 1919. Rating curve well defined. Staff gage read once a day to hundredths. Daily discharge determined by applying daily gage height to rating table. Records good.

Discharge measurements of East Fork of Sevier River at Coyoto, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
May 18	Russell and Purton	1.06	2.3	Sept. 22	G. H. Russell	1.62	21.4
July 9	G. H. Russell	1.16	2.6				
Aug. 16	do	1.54	16.9	1920.			
25	do	1.65	24.0	Jan. 16	A. B. Purton	1.12	4.4

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Daily discharge, in second-feet, of East Fork of Sevier River at Coyoto, Utah, for the period May 18 to Aug. 25, 1919.

Day.	May.	June.	July.	Aug.	Day.	May.	June.	July.	Aug.
1	.....	3	8	16	16	.....	2	28	30
2	.....	3	3	16	17	.....	2	26	23
3	.....	3	2	18	18	2	2	25	23
4	.....	3	2	18	19	2	2	23	25
5	.....	3	2	19	20	3	2	23	24
6	.....	4	2	20	21	2	2	23	23
7	.....	3	2	20	22	3	2	25	23
8	.....	3	2	20	23	2	5	23	25
9	.....	2	2	20	24	2	2	20	26
10	.....	2	3	20	25	2	2	19	24
11	.....	2	3	20	26	2	2	18	.....
12	.....	2	2	22	27	2	2	18	.....
13	.....	2	3	22	28	2	3	42	.....
14	.....	2	3	22	29	2	2	20	.....
15	.....	2	3	23	30	2	2	19	.....
					31	3	.....	18	.....

Monthly discharge of East Fork of Sevier River at Coyoto, Utah, for the period May 18 to Aug. 25, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 18-31	3	2	2.2	61
June	5	2	2.4	143
July	42	2	13.3	818
August 1-25	30	16	21.7	1,080
The period	.....	.....	.....	2,100

EAST FORK OF SEVIER RIVER NEAR KINGSTON, UTAH.

LOCATION.—In SW. ¼ sec. 13, T. 30 S., R. 3 W., 1 mile below highway bridge and 2 miles east of Kingston, Piute County.

DRAINAGE AREA.—1,260 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 29, 1914, to September 30, 1920. Records obtained about 1½ miles above Rockyford bridge, in SW. ¼ sec. 16, T. 30 S., R. 2½ W., March 27, 1913, to April 28, 1914; also at gage three-fourths of a mile north of Kingston, in NE. ¼ sec. 10, T. 30 S., R. 3 W., May 11 to September 20, 1912.

GAGE.—Stevens continuous water-stage recorder on right bank, 1 mile below highway bridge; established April 29, 1914; inspected by W. S. Price.

DISCHARGE MEASUREMENTS.—Made from cable 2 miles above gage, highway bridge 1 mile above, or by wading.

CHANNEL AND CONTROL.—One channel at all stages. Right bank is overflowed during high water. Bed composed of gravel. Concrete control 20 feet below gage since December 11, 1917.

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EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 5.00 feet at 6.30 p. m. August 8 (discharge from extension of rating curve, 900 second-feet); minimum stage, from water-stage recorder, 2.44 feet throughout the day January 11 (discharge, 9 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 4.10 feet at 2 p. m. June 28 (discharge, 420 second-feet); minimum discharge probably less than 10 second-feet in December or January when river was icebound.

1913-1920: Maximum stage recorded, 4.46 feet at 3 p. m. May 18, 1917 (discharge, 946 second-feet); minimum stage recorded, 1.00 foot September 19, 20, and 21, 1913 (discharge, 8 second-feet).

ICE.—Stage-discharge relation seriously affected by ice.

DIVERSIONS.—Above all diversions in vicinity of Kingston.

REGULATION.—Flow affected by operation of gates at Otter Creek reservoir 8 miles above.

ACCURACY.—Stage-discharge relation changed May 19, June 20, and August 4-22, 1920; affected by ice November 26, 1918, to January 10, 1919, January 17 to February 13, 1919, and November 28, 1919, to February 4, 1920. Rating curves well defined. Operation of water-stage recorder satisfactory except April 4, 5, 22-28, May 9-10, and September 2 and 10, 1919. Daily discharge ascertained by applying to rating tables the daily mean gage height determined from recorder graph. Discharge for ice periods estimated from meter measurements, observer's notes, and temperature records. Discharge interpolated for days of faulty gage-height record. Records good.

Discharge measurements of East Fork of Sevier River near Kingston, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 5	J. J. Sanford	3.18	113	Sept. 4	G. H. Russell	3.08	88
Nov. 6	do	2.56	17.5	12	do	2.93	80
				23	do	2.80	42.5
1919.				1920.			
Jan. 5	Sanford and Purton	[a] 2.99	13.2	Jan. 15	A. B. Purton	[a] 3.48	9.9
6	Purton and Sanford	[a] 2.58	9.0	16	do	[a] 4.08	12.6
Apr. 6	A. B. Purton	3.32	147	June 19	R. R. Rowe	2.89	21.8
May 17	Russell and Purton	2.66	25.9	21	do	3.56	186
June 9	G. H. Russell	3.40	175	Sept. 15	A. B. Purton	3.75	201
July 9	do	3.69	256	15	do	3.75	209
Aug. 7	do	3.62	247	16	do	3.74	197
24	do	3.38	176				

[a] Stage-discharge relation affected by ice.

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Daily discharge, in second-feet, of East Fork of Sevier River near Kingston, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	97	71				31	59	81	29	248	264	68
2	121	71				29	86	92	43	256	264	82
3	118	70				25	110	92	137	256	264	97
4	115	65				26	108	97	159	256	264	92
5	110	28		13		27	106	99	159	260	264	81
6	108	21				27	104	86	159	256	260	70
7	101	18			20	27	82	57	169	252	256	56
8	99	17				24	63	39	182	248	288	41
9	84	17				25	50	39	178	248	276	33
10	67	17				21	36	38	175	252	240	59
11	68	15		12		24	33	38	175	252	189	67
12	70	15		12		26	53	37	175	252	165	63
13	71	13		13		29	70	33	182	256	165	60
14	77	17		11	21	31	82	27	186	256	162	59
15	81	18		9	23	26	87	26	189	256	156	59
16	71	19	18	11	25	28	92	26	189	256	156	56
17	73	19			21	21	81	27	196	280	165	51
18	71	20		15	23	22	82	25	200	280	178	51
19	71	21			22	24	159	25	203	280	186	49
20	71	22			22	22	189	24	203	276	186	46
21	73	21			22	37	229	24	203	272	186	43
22	71	22			19	33		26	203	272	186	41
23	70	22			26	32		26	203	272	178	43
24	70	26			25	31		25	203	272	175	43
25	70	22			26	30	140	28	203	264	165	46
26	68			20	28	29		31	233	260	162	46
27	67				26	28		31	233	260	153	46
28	67	20			23	30		31	237	264	143	49
29	70				.....	31	47	31	240	264	137	47
30	71				.....	42	46	30	244	264	106	47
31	71	.....			.....	60	.....	28	.....	264	82	.....
1919-20.												
1	47	46				21	19	21	30	325	292	206
2	89	49				24	21	32	29	307	302	206
3	51	50			15	24	21	22	29	302	316	202
4	54	51				28	19	19	30	289	302	202
5	51	53			16	22	19	21	31	289	289	198
6	41	51			17	22	19	28	32	293	296	172
7	41	51			16	19	18	35	30	293	298	175
8	41	54		10	16	18	17	30	26	293	289	182
9	41	54			16	21	18	22	30	298	268	185
10	41	56			15	21	18	19	33	307	247	192
11	42	60			15	20	20	22	32	316	220	196
12	41	57			15	19	19	21	30	316	202	196
13	42	56			20	20	19	22	28	311	196	199
14	43	56			22	21	20	26	28	311	188	199
15	44	56		10	24	23	86	27	25	307	182	202
16	44	56	10	13	24	21	94	29	24	307	182	199
17	44	57			25	21	94	30	24	302	179	202
18	44	59			25	20	92	42	23	293	175	206
19	43	59			26	20	92	74	22	276	185	202
20	43	59			24	19	97	118	70	268	185	199
21	43	33			25	19	97	125	185	268	175	185
22	43	20			31	23	97	128	192	268	169	128
23	44	21			28	24	99	128	202	268	166	131
24	42	22		15	24	24	97	125	192	272	169	128
25	47	20			22	21	97	79	188	276	172	131
26	46	22			20	19	97	57	199	276	179	131
27	46	19			20	19	90	49	320	280	179	131
28	42				20	23	32	43	393	276	185	131
29	42	15			20	23	17	39	368	280	185	131
30	43				.....	21	10	35	348	280	185	131
31	43	.....			.....	21	.....	30	.....	289	199	.....

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Monthly discharge of East Fork of Sevier River near Kingston, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	121	67	81	4,980
November	71	13	26.2	1,560
December	.....	.....	18.0	1,110
January	.....	.....	15.4	947
February	.....	.....	21.8	1,210
March	60	21	29.0	1,780
April	.....	.....	101	6,010
May	99	24	42.5	2,610
June	244	29	183	10,900
July	280	248	261	16,000
August	288	82	194	11,900
September	97	33	56.0	3,330
The year	288	.....	86.3	62,300
1919–20.				
October	54	41	44.2	2,720
November	60	.....	43.1	2,560
December	.....	.....	10.0	615
January	.....	.....	12.5	769
February	31	.....	20.2	1,160
March	24	18	21.2	1,300
April	99	10	51.8	3,080
May	128	19	48.5	2,980
June	393	22	106	6,310
July	325	268	291	17,900
August	316	166	218	13,400
September	206	128	176	10,500
The year	393	.....	87.2	63,300

COYOTO CANAL NEAR COYOTO, UTAH.

LOCATION.—Half a mile west of Riddle ranch house, half a mile south of mouth of Antimony Creek, and 3 miles south of Coyoto, Garfield County.

RECORDS AVAILABLE.—July 30 to September 30, 1916; June to August, 1917; May to September, 1918; and May to September, 1919, when station was discontinued.

GAGE.—Vertical staff on left bank; read by Utahna Riddle.

DISCHARGE MEASUREMENTS.—Made from footbridge.

CHANNEL AND CONTROL.—Earth channel; fairly permanent.

DIVERSIONS.—None above gage.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation changed frequently. Standard rating curve fairly well defined. Parallel curves and shifting-control method used for most of the period of records. Staff gage read once each day to half-tenths. Daily discharge determined by applying daily gage height to rating table. Records fair.

Discharge measurements of Coyoto canal near Coyoto, Utah, during the year ending Sept. 30, 1919.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 18	Russell and Purton	5.00	20.9	July 26	G. H. Russell	4.70	13.5
June 2	G. H. Russell	5.14	21.8	Aug. 16	do	4.72	12.0
19	do	4.83	14.9	26	do	4.65	11.9
July 9	do	4.81	11.9	Sept. 22	do	4.67	11.2

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Daily discharge, in second-feet, of Coyoto canal near Coyoto, Utah, for the year ending Sept. 30, 1919.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	.....	21	20	15	11	16	.....	16	13	12	6
2	.....	21	17	15	9	17	.....	16	14	12	6
3	.....	21	15	15	9	18	21	16	14	12	6
4	.....	21	14	15	9	19	31	19	14	12	5
5	.....	21	12	15	9	20	27	19	14	12	7
6	.....	21	12	15	9	21	25	19	17	12	6
7	.....	15	12	14	7	22	30	19	17	13	7
8	.....	15	12	14	6	23	26	20	20	13	7
9	.....	21	12	14	6	24	26	21	16	13	7
10	.....	21	12	14	6	25	25	21	14	14	7
11	.....	21	12	12	6	26	24	21	16	12	7
12	.....	20	12	12	6	27	22	21	16	11	7
13	.....	19	13	12	6	28	22	21	15	11	8
14	.....	19	13	12	6	29	24	21	15	11	8
15	.....	18	13	12	6	30	24	18	15	11	8
						31	21	.....	15	11	.....

Monthly discharge of Coyoto canal near Coyoto, Utah, for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 18-31	31	21	24.9	690
June	21	15	19.4	1,150
July	20	12	14.4	885
August	15	11	12.8	787
September	11	5	7.1	422
The period	.....	.....	.....	3,930

OTTER CREEK ABOVE RESERVOIR, NEAR COYOTO, UTAH.

LOCATION.—In sec. 25, T. 29 S., R. 2 W., three-quarters of a mile above Otter Creek reservoir and 10 miles north of Coyoto, Garfield County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 17 to August 10, 1915; October 1, 1915, to June 30, 1920, when station was discontinued.

GAGE.—Vertical staff on right bank; read by Nelo Brindley.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—One channel at all stages. Bed composed of sand and gravel.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.78 feet at 6 a. m. March 20 (discharge, 103 second-feet). Creek dry May 18 to September 30.

Maximum stage during year ending September 30, 1920, not recorded; creek dry October 1–18.

1915–1920: Maximum stage recorded, 3.78 feet March 20, 1919 (discharge, 103 second-feet); creek dry May 18 to October 18, 1919.

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Practically the entire low-water flow in the summer diverted above the station for irrigation.

REGULATION.—One reservoir storing water for irrigation upstream; capacity unknown.

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ACCURACY.—Stage-discharge relation assumed permanent, but no open-water measurements were made to verify the rating for 1920; affected by ice November 23, 1918, to March 15, 1919, and November 27, 1919, to February 9, 1920. Rating curve well defined. Staff gage read to hundredths once a day except when creek was dry and May 1–18, 1920. Daily discharge determined by applying daily gage height to rating table. Discharge estimated for periods of ice effect from meter measurements, observer's notes, and temperature records. Discharge interpolated October 27 to November 5, 1918, because of unreliable gage-height readings. Records fair.

Discharge measurements of Otter Creek above reservoir, near Coyoto, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
1918. Nov. 6	J. J. Sanford	1.52	18.8	1919. Apr. 7	A. B. Purton	3.10	71
1919. Jan. 5	A. B. Purton	[a] 1.58	8.7	1920. Jan. 16	do	[a] 2.87	7.8

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Otter Creek above reservoir, near Coyoto, Utah, for the period Oct. 1, 1918, to June 30, 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	6						74	30				
2	6						88	22				
3	6	18					90	16				
4	6						93	13				
5	6						86	12				
				9								
6	6	19					89	10				
7	6	17					74	5				
8	6	19				20	65	2				
9	6	19					54	2				
10	6	19					50	2				
11	6	20					38	2				
12	6	20					40	2				
13	13	20					39	2				
14	13	20					40	2				
15	13	23			15		39	1				
			15						0	0	0	0
16	13	25				25	40	1				
17	15	25				28	39	1				
18	15	25				31	43					
19	15	25				57	42					
20	15	25				103	51					
				10								
21	15	25				94	47					
22	15	25				89	39					
23	15					67	40					
24	15					79	43	0				
25	15					67	37					
26	17	20				84	36					
27						67	31					
28						75	31					
29	17				.....	79	31					
30					.....	67	32					
31		.....			.....	74	.....		.....			.....

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Daily discharge, in second-feet, of Otter Creek above reservoir, near Coyoto, Utah, for the period Oct. 1, 1918, to June 30, 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	0	8				50	25		9			
2	0	12				49	23		8			
3	0	12				42	19		7			
4	0	12				39	13		7			
5	0	12			15	50	37		5			
6	0	12				31	47		5			
7	0	13				32	47		3			
8	0	13				32	31		3			
9	0	13				32	21		3			
10	0	12			25	31	18		2			
11	0	12			27	33	17		2			
12	0	13			25	27	16		2			
13	0	12			26	27	15		2			
14	0	12			28	26	12		2			
15	0	12			28	25	13		2			
16	0	13	7	8	28	21	15		2			
17	0	13			26	23	13		2			
18	0	12			27	27	13		2			
19	8	12			30	21	13	84	2			
20	7	13			32	21	17	84	2			
21	8	12			31	27	17	84	2			
22	6	12			31	25	19	86	2			
23	7	13			32	31	20	88	2			
24	8	12			35	28	19	73	2			
25	8	10			37	30	13	71	2			
26	8	7			35	26	12	61	2			
27	8				36	26	7	55	2			
28	8	7			37	24	7	50	2			
29	8				42	23	7	29	2			
30	8					24	7	10	2			
31	9					22		10				

Monthly discharge of Otter Creek above reservoir, near Coyoto, Utah, for the period Oct. 1, 1918, to June 30, 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October		6	11.6	713
November	25		20.7	1,230
December			15.0	922
January			9.7	596
February			15.0	833
March	103		44.7	2,750
April	93	31	51.4	3,060
May	30	0	4.0	248
June	0	0	0	0
July	0	0	0	0
August	0	0	0	0
September	0	0	0	0
The year	103	0	14.3	10,400
1919–20.				
October	9	0	3.3	202
November	13		11.2	666
December			7.0	430
January			8.0	492
February	42		26.0	1,500
March	50	21	29.8	1,830
April	47	7	18.4	1,090
May 19–31	88	10	61.1	1,580
June	9	2	3.1	184

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OTTER CREEK NEAR COYOTO, UTAH.

LOCATION.—In W. ½ sec. 28, T. 30 S., R. 2 W., just below outlet of Otter Creek reservoir, 5 miles northwest of Coyoto, and 12 miles east of Kingston, Piute County.

DRAINAGE AREA.—Indeterminate; 400 square miles of Otter Creek basin are tributary to reservoir; the reservoir also receives water from East Fork of Sevier River.

RECORDS AVAILABLE.—June 21, 1913, to September 30, 1919; irrigation seasons only. Station discontinued.

GAGE.—Stevens continuous water-stage recorder on left bank, with outside staff gage.

DISCHARGE MEASUREMENTS.—Made by wading just below gage.

CHANNEL AND CONTROL.—One channel at all stages. Bed composed of gravel. Broad crested concrete weir just below gage serves as permanent control. Growth of moss on control and in channel causes backwater at times.

DIVERSIONS.—Some diversions for irrigation above reservoir.

REGULATION.—Flow past station controlled by operation of outlet gates of reservoir just above.

ACCURACY.—Stage-discharge relation permanent during 1919. Rating curve well defined. Operation of water-stage recorder satisfactory except May 19–31 and September 16–22. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Discharge interpolated May 19–31 and September 16–22. Records good.

Discharge measurements of Otter Creek near Coyoto, Utah, during the year ending Sept. 30, 1919.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 5	J. J. Sanford	0.92	43.8	Sept. 4	G. H. Russell	1.00	52.3
July 9	G. H. Russell	2.28	252	23	do	.62	11.5
Aug. 24	do	1.67	150				

Daily discharge, in second-feet, of Otter Creek near Coyoto, Utah, for the year ending Sept. 30, 1919.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1		3	243	245	77	16		201	241	165	
2		41	245	245	69	17		206	243	166	
3		127	245	240	62	18	3	206	241	171	
4		142	253	243	52	19		206	246	169	13
5		142	252	238	40	20		206	246	169	
6		142	250	238	31	21		204	246	173	
7		160	248	236	25	22		204	246	168	
8		171	248	231	24	23		204	246	160	12
9		171	250	226	24	24		204	243	152	12
10		171	248	179	22	25	3	212	243	144	12
11		173	246	165	19	26		241	241	134	12
12		173	246	163	18	27		241	245	126	11
13		176	246	166	17	28		243	241	115	11
14		187	245	168	14	29		245	245	104	11
15		187	243	165	14	30		245	245	97	10
						31			246	86	

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Monthly discharge of Otter Creek near Coyoto, Utah, for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 18-31	.....	.....	3.0	83
June	245	3	181	10,800
July	253	241	246	15,100
August	245	86	176	10,800
September	77	10	23.0	1,370
The period	.....	.....	.....	38,200

OTTER CREEK RESERVOIR FEEDER CANAL AT HEAD, NEAR COYOTO, UTAH.

LOCATION.—In NW. ¼ sec. 15, T. 31 S., R. 2 W., just below crossing of unnamed wash over canal and half a mile southwest of school house at Coyoto, Garfield County.

RECORDS AVAILABLE.—December 8, 1914, to July 29, 1915; August 1, 1916, to September 30, 1919, when station was discontinued.

GAGE.—Vertical staff on right bank fastened to old bridge abutment August 1, 1916, to September 30, 1919; read by Elmer Black. Original gage, vertical staff fastened to left abutment of same bridge.

DISCHARGE MEASUREMENTS.—Made by wading or from plank across flume.

CHANNEL AND CONTROL.—One channel at all stages. Control practically permanent; affected slightly by moss growth in summer.

ICE.—None.

DIVERSIONS.—None above station.

REGULATION.—Flow in canal regulated by head gates.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read once daily to hundredths. Daily discharge determined by applying gage height to rating table. Records good.

Canal diverts water from East Fork of Sevier River in SW. ¼ sec. 15, T. 31 S., R. 2 W., for storage in Otter Creek reservoir.

Discharge measurements of Otter Creek reservoir feeder canal at head, near Coyoto, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
May 18	G. H. Russell	2.39	62	Aug. 25	G. H. Russell	1.42	3.6
June 2	do	2.02	35.3				
19	do	1.79	18.7	1920.			
July 9	do	1.86	23.8	Jan. 16	A. B. Purton	(a)	52
26	do	1.52	5.1				

a No gage.

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Daily discharge, in second-feet, of Otter Creek reservoir feeder canal at head, near Coyoto Utah, for the year ending Sept. 30, 1919.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1		34	26	6	8	16		20	1	5	
2		34	19	7	6	17		20	1	5	
3		36	18	7	4	18	63	20	1	5	
4		36	18	8	3	19	48	19	1	5	
5		32	19	7	3	20	45	19	1	5	
6		30	20	7	2	21	46	19	1	5	
7		30	22	7		22	46	18	1	4	
8		26	22	7		23	43	18	2	4	0
9		25	22	7		24	42	18	3	4	
10		23	26	6		25	45	18	5	4	
11		25	26	7	0	26	45	14	7	4	
12		23	25	6		27	43	14	6	4	
13		23	39	6		28	45	15	5	4	
14		22	26	6		29	42	15	5	3	
15		20	25	5		30	36	15	5	6	
						31	36		5	7	

Monthly discharge of Otter Creek reservoir feeder canal at head, near Coyoto, Utah, for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 18-31	63	36	44.6	1,240
June	36	14	22.7	1,350
July	39	1	13.0	799
August	8	3	5.6	344
September	8	0	.9	52
The period				3,780

OTTER CREEK RESERVOIR FEEDER CANAL AT MOUTH, NEAR COYOTO, UTAH.

LOCATION.—In sec. 22, T. 30 S., R. 2 W., just above point where canal discharges into reservoir and 4 miles north of Coyoto, Garfield County.

RECORDS AVAILABLE.—July 29 to August 15, 1915, and November 12, 1915, to June 30, 1920, when station was discontinued.

GAGE.—Vertical staff fastened to right side of rating flume; read by Delbert Moore.

DISCHARGE MEASUREMENTS.—Made from plank across flume.

CHANNEL AND CONTROL.—Artificial earth channel; rating flume forms a permanent control.

DIVERSIONS.—Some water diverted from this canal in vicinity of Coyoto for irrigation.

REGULATION.—Flow in canal regulated by head gates.

ACCURACY.—Stage-discharge relation changed several times; affected by ice January 4–12, 1919, and January 6–21, 1920. Standard rating curve used with shifts to parallel curves. Gage read daily to half-tenths. Gage-height record November 4–24, 1918, and May 19–26, 1919, somewhat doubtful. Daily discharge determined by applying daily gage height to rating table. Discharge estimated for ice periods and periods of doubtful gage-height record. Records fair.

This canal diverts water from East Fork of Sevier River in SW. ¼ sec. 15, T. 31 S., R. 2 W., near Coyoto, for storage in Otter Creek reservoir.

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Discharge measurements of Otter Creek reservoir feeder canal at mouth, near Coyoto, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Nov. 6	J. J. Sanford	1.44	49.6	June 1	G. H. Russell	0.98	23.4
				July 9	do	.78	8.1
1919.							
Jan. 5	Purton and Sanford	[a] 2.54	57	1920.			
Apr. 7	A. B. Purton	[b] 2.35	126	Jan. 15	A. B. Purton	1.55	52
May 18	Russell and Purton	1.24	43.5				

[a] Stage-discharge relation affected by ice.
[b] Drift on control.

Daily discharge, in second-feet, of Otter Creek reservoir feeder canal at mouth, near Coyoto, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1919.									
1		46	46	65	46	73	132	25	3
2		50	46	55	38	86	114	25	7
3		50	55	55	38	77	120	25	7
4	20	50	56	65	38	108	117	22	7
5	50	55	57	65	38	120	108	22	7
6	50	55		65	38	120	102	22	7
7		65		75	38	120	96	19	7
8		55		75	38	126	84	19	7
9		55	60	65	38	145	84	16	7
10		55		55	38	132	78	16	7
11		55		55	38	132	73	14	7
12		55		55	38	132	73	14	7
13		55	65	55	38	139	73	14	7
14		55	65	55	38	135	68	14	7
15		55	65	55	38	145	68	14	3
16	55	55	65	55	38	145	68	14	
17		55	65	55	38	145	68	14	
18		55	65	55	38	158	44	14	
19		55	55	55	38	152		14	
20		55	55	55	38	152		14	
21		55	55	55	42	168		14	
22		55	55	55	38	170	42	14	
23		55	55	50	30	177		9	
24		55	55	38	38	189		9	0
25	46	55	55	42	38	199		9	
26	46	55	55	42	38	191		9	
27	46	55	55	42	60	184	40	9	
28	46	55	55	46	55	173	40	6	
29	46	55	55	.....	62	196	40	0	
30	46	55	55	.....	64	192	32	0	
31	.....	55	55	.....	71	.....	32	.....	

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Daily discharge, in second-feet, of Otter Creek reservoir feeder canal at mouth, near Coyoto, Utah, for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1920.									
1		47	38	47	47	47	280	221	.....
2		47	38	47	47	47	310	179	.....
3		47	38	47	47	47	325	140	.....
4		47	38	47	47	47	325	90	.....
5		47	38	47	47	47	325	78	.....
6		47		47	47	38	340	67	.....
7		47		47	47	57	372	67	.....
8		47		47	47	90	388	57	.....
9		47		52	47	127	388	47	.....
10		42	45	47	47	114	388	38	.....
11	0	42		42	47	102	356	30	.....
12		47		42	47	114	326	26	.....
13		47		47	42	120	296	23	.....
14		38		47	42	140	280	23	.....
15		34	52	47	47	166	280	23	.....
16		34		47	47	193	356	20	.....
17		34		47	42	193	356	17	.....
18		34		47	42	179	372	14	.....
19		34	50	47	42	153	420	12	.....
20		34		47	42	153	436	12	.....
21	12	34		47	38	153	452	12	.....
22	30	34	47	47	42	127	452	10	.....
23	34	34	42	47	42	127	485	10	.....
24	38	34	47	47	47	127	485	3	.....
25	38	34	47	47	47	127	485	3	.....
26	38	34	47	47	47	127	420	2	.....
27	47	34	47	47	47	134	420	2	.....
28	47	34	47	47	47	140	372	.....	.....
29	42	34	47	52	47	160	325	.....	.....
30	47	34	47	.....	42	221	265	.....	.....
31	.....	34	47	.....	42	.....	235	.....	.....

NOTE.—No water in canal Oct. 1 to Nov. 3, 1918, July 16 to Nov. 20, 1919, and June 27–30, 1920.

Monthly discharge of Otter Creek reservoir feeder canal at mouth, near Coyoto, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	0	0	0	0
November	.....	0	46.2	2,750
December	65	46	54.5	3,350
January	.....	46	57.6	3,540
February	75	38	55.7	3,090
March	71	30	42.1	2,590
April	199	73	146	8,690
May	132	32	67.4	4,140
June	25	0	14.3	851
July	7	0	3.1	191
August	0	0	0	0
September	0	0	0	0
The year	199	0	40.3	29,200
1919–20.				
October	0	0	0	0
November	47	0	12.4	738
December	47	34	39.3	2,420
January	.....	38	45.5	2,800
February	52	42	47.0	2,700
March	47	38	45.1	2,770
April	221	38	121	7,200
May	485	235	365	22,400
June	221	0	40.9	2,430
The period	.....	.....	.....	43,300

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KINGSTON CANAL AT KINGSTON, UTAH.

LOCATION.—In NE. ¼ sec. 15, T. 30 S., R. 3 W., 300 feet below head of canal, at east edge of town of Kingston, Piute County, on road to Coyoto.

RECORDS AVAILABLE.—May 15, 1914, to October 4, 1919; irrigation seasons only. Station discontinued.

GAGE.—Stevens continuous water-stage recorder, with inside and outside staff gages.

DISCHARGE MEASUREMENTS.—Made by wading 75 feet above gage.

CHANNEL AND CONTROL.—Bed composed of gravel. Crest of a combination concrete weir and dividing box in canal just below gage serves as permanent control.

DIVERSIONS.—Above all diversions from canal.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation permanent during 1919, except for backwater June 1–7 and July 13–20. Rating curve well defined. Curves parallel to principal curve applicable for periods of backwater. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Records good.

Canal diverts water from left side of East Fork of Sevier River in NW. ¼ sec. 14, T. 30 S., R. 3 W., for irrigation near Kingston.

Discharge measurements of Kingston canal at Kingston, Utah, during the year ending Sept. 30, 1919.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 17	Russell and Purton	1.03	19.3	Aug. 7	G. H. Russell	1.09	22.2
June 1	G. H. Russell	1.12	22.2	Sept. 4	do	.78	7.7
19	do	.92	13.2	22	do	.95	15.6
July 18	do	1.09	24.1				

Daily discharge, in second-feet, of Kingston canal at Kingston, Utah, for the period Apr. 7 to Oct. 4, 1919.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1		10	21	16	10	16	22
2		22	22	12	10	14	23
3		22	24	12	10	8	24
4		21	22	20	10	8	23
5		18	22	22	18	8	
6		18	22	22	23	7	
7	2	18	22	22	22	10	
8		18	18	24	18	20	
9		18	11	22	14	22	
10		18	11	15	14	22	
11		17	11	11	12	22	
12		18	19	12	11	20	
13		18	23	20	11	20	
14		14	23	24	11	20	
15		12	23	24	16	20	
	3						
16		14	22	24	23	21	
17		15	22	24	23	21	
18		20	22	24	21	22	
19		20	18	24	21	20	
20		20	14	22	20	20	
21		18	14	9	20	18	
22		24	14	9	20	20	
23		27	16	12	15	19	
24	10	26	23	12	10	18	
25	11	27	22	22	11	20	
26	12	29	23	24	11	20	
27	8	28	24	24	10	20	
28	6	24	25	24	11	19	
29	5	21	25	24	18	21	
30	3	21	18	23	18	21	
31		20		22	18		

NOTE.—Discharge, Apr. 8–23 and May 6–9, estimated. Braced figure shows mean discharge for period indicated.

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Monthly discharge of Kingston canal at Kingston, Utah, for the period Apr. 7 to Oct. 4, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 7-30	12	.....	4.4	208
May	29	10	19.9	1,220
June	25	11	19.9	1,180
July	24	9	19.5	1,200
August	23	10	15.5	953
September	22	7	17.9	1,070
October 1-4	24	22	23.0	182
The period	.....	.....	.....	6,010

PINE CREEK[1] (UPPER STATION) NEAR MARYSVALE, UTAH.

LOCATION.—In sec. 35, T. 27 S., R. 4 W., half a mile above Cuff's ranch and 3 miles southwest of Marysvale, Piute County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 13 to September 30, 1918, and May 14 to September 30, 1919, when station was discontinued.

GAGE.—Vertical enamel staff on right bank 100 yards above Taylor canal heading; installed August 22, 1917; read by Harry Cuff.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Channel straight for 50 feet above and 150 feet below gage. Current swift. Banks low and subject to overflow. One channel at all stages. Stream bed composed of rocks and gravel.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of records, 1.70 feet at 10 a. m. May 27, 1919 (discharge, 137 second-feet); minimum stage, 0.76 foot August 15, 16, 20, 21, and 25, 1919 (discharge, 3 second-feet).

ICE.—No record during winter.

DIVERSIONS.—Above all diversions.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read once a day to hundredths. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Pine Creek (upper station) near Marysvale, Utah, during the year ending Sept. 30, 1919.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 14	Purton and Russell	1.40	63.0	July 16	G. H. Russell	0.87	5.6
29	G. H. Russell	1.30	43.6	Aug. 4	.....do	.80	3.7
June 19	.....do	1.10	19.0	Sept. 4	.....do	.79	3.6

[1] Known locally as Bullion Creek.

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Daily discharge, in second-feet, of Pine Creek (upper station) near Marysvale, Utah, for the year ending Sept. 30, 1919.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	.....	38	13	5	4	16	105	28	6	3	4
2	.....	30	12	5	4	17	110	19	6	3	4
3	.....	28	12	4	4	18	110	21	6	3	4
4	.....	33	9	4	4	19	110	19	6	3	4
5	.....	30	9	4	4	20	63	18	5	3	4
6	.....	36	8	4	4	21	71	16	5	3	4
7	.....	44	6	4	4	22	80	13	6	3	4
8	.....	48	6	4	4	23	76	15	6	3	4
9	.....	33	6	5	4	24	67	16	6	3	5
10	.....	55	8	5	4	25	80	15	5	3	4
11	.....	30	6	5	4	26	84	15	6	3	5
12	.....	36	6	4	4	27	137	12	4	3	5
13	.....	26	6	4	4	28	84	10	4	3	4
14	63	28	6	3	4	29	44	11	5	3	5
15	100	23	6	3	4	30	59	12	5	3	4
						31	44	.....	5	4	.....

Monthly discharge of Pine Creek (upper station) near Marysvale, Utah, for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 14-31	137	44	82.6	2,950
June	55	10	25.3	1,510
July	13	4	6.6	406
August	5	3	3.6	222
September	5	4	4.1	246
The period	.....	.....	.....	5,330

PINE CREEK[1] AT MARYSVALE, UTAH.

LOCATION.—In sec. 20, T. 27 S., R. 3 W., 300 feet above bridge over Pine Creek at Marysvale, Piute County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 16 to September 30, 1918, and May 14 to September 30, 1919, when station was discontinued. May 20 to July 31, 1914, records were obtained at Denver & Rio Grande Railroad bridge one-fourth mile above mouth.

GAGE.—Vertical enamel staff gage on left bank; read by Fern Kelly.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Channel straight for 100 feet above and 50 feet below gage. Current swift. Banks low and subject to overflow. One channel at all stages. Stream bed composed of rocks and gravel.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of records, 2.1 feet at 9 a. m. May 28, 1919 (discharge, 143 second-feet); creek dry a large part of each year.

ICE.—No record during winter.

DIVERSIONS.—Station is below all diversions from Pine Creek and shows amount of water entering Sevier River.

REGULATION.—By diversions only.

[1] Known locally as Bullion Creek.

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ACCURACY.—Stage-discharge relation permanent during period of records. Rating curve fairly well defined. Staff gage read to tenths once a day. Daily discharge determined by applying daily gage height to rating table. Records fair.

The following discharge measurement was made by G. H. Russell:
May 14, 1919: Gage height, 0.64 foot; discharge, 4.0 second-feet.

Daily discharge, in second-feet, of Pine Creek at Marysvale, Utah, for the year ending Sept. 30, 1919.

Day.	May.	June.	Day.	May.	June.	Day.	May.	June.
1		12	11			21	18	
2		8	12			22	12	
3		5	13			23	8	
4		0	14	4	0.1	24	8	
5		0	15			25	33	
6			16			26	33	
7			17	10		27	12	
8		.1	18			28	60	
9			19			29	33	
10			20			30	18	
						31	12	

NOTE.—Creek reported dry June 17 to Sept. 30.

Monthly discharge of Pine Creek at Marysvale, Utah, for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 14–31	60		17.3	619
June	12	0	.9	52
July	0	0	0	0
August	0	0	0	0
September	0	0	0	0
The period				671

CLEAR CREEK AT SEVIER, UTAH.

LOCATION.—In SE. ¼ sec. 32, T. 25 S., R. 4 W., at Sevier, Sevier County, 100 yards above confluence of stream with Sevier River. Dry Creek enters from right 2½ miles above and Mill Creek, 8 miles above station.

DRAINAGE AREA.—150 square miles (measured on topographic maps).

RECORDS AVAILABLE.—February 23, 1912, to September 30, 1919, when station was discontinued.

GAGE.—Stevens 8-day water-stage recorder on right bank.

DISCHARGE MEASUREMENTS.—Made by wading or from log bridge just above gage.

CHANNEL AND CONTROL.—One channel at all stages. Bed composed of sand and gravel. Concrete cut-off wall, installed just below gage August 31, 1914, serves as control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period April 4 to September 30, 1919, from water-stage recorder, 2.38 feet at 11 p. m. May 28 (discharge, 98 second-feet); minimum stage recorded, 0.82 foot August 16 (discharge, 0.5 second-foot).

1912–1919: Maximum stage recorded, 3.15 feet May 24, 1914 (discharge, 240 second-feet); stream dry August 26, 1913.

ICE.—Stage-discharge relation not affected by ice except occasionally for short periods.

DIVERSIONS.—Cove canal diverts about three-fourths of a mile above the station.

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REGULATION.—Flow affected slightly by the operation of a small reservoir on one of the tributaries.

ACCURACY.—Stage-discharge relation permanent during 1919. Rating curve well defined. Operation of water-stage recorder unsatisfactory for several short periods and April 14 to May 13 when staff gage was read once a week. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Discharge interpolated for periods when recorder failed to operate. Records fair.

Discharge measurements of Clear Creek at Sevier, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Ft.	*Sec.-ft.*			*Ft.*	*Sec.-ft.*
1918.				1919.			
Oct. 7	J. J. Sanford	1.34	19.8	Aug. 4	G. H. Russell	1.01	4.8
				27	do	.88	1.3
1919.				Sept. 18	do	.91	2.1
Apr. 4	A. B. Purton	1.92	59				
May 14	Russell and Purton	1.99	66	1920.			
31	G. H. Russell	2.05	70	Jan. 14	A. B. Purton	1.30	11.7
June 18	do	1.18	11.6	June 18	R. R. Rowe	1.86	89
July 15	do	1.20	11.9				

Daily discharge, in second-feet, of Clear Creek at Sevier, Utah, for the year ending Sept. 30, 1919.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1		83	60	13	9	2	16	57	70	16	11	1	2
2		85	48	11	9	4	17	59	75	14	7	7	2
3		87	41	10	8	4	18	61	79	12	6	6	2
4	60	89	39	11	6	3	19	64	77	12	5	4	2
5	56	85	32	12	5	3	20	66	74	18	5	3	2
6	51	82	28	10	6	3	21	67	74	18	4	2	2
7	47	78	28	9	5	3	22	68	71	18	3	2	2
8	42	75	27	8	5	3	23	69	67	21	2	2	2
9	36	71	24	6	4	3	24	71	64	22	2	2	2
10	36	68	23	6	3	2	25	72	63	21	2	2	2
11	40	64	22	6	2	2	26	73	60	19	2	1	2
12	44	63	20	7	1	2	27	74	69	16	2	1	2
13	50	63	19	12	1	2	28	76	86	16	3	1	2
14	52	62	18	16	1	2	29	78	94	14	18	2	2
15	55	66	16	15	1	2	30	80	85	14	11	2	2
							31		72		14	2	

Monthly discharge of Clear Creek at Sevier, Utah, for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 4-30	80	36	59.4	3,180
May	94	60	74.2	4,560
June	60	12	23.2	1,380
July	18	2	8.0	492
August	9	1	3.4	209
September	4	2	2.3	137
The period				9,960

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COVE CANAL AT SEVIER, UTAH.

LOCATION.—In sec. 32, T. 25 S., R. 4 W., 90 feet below head of canal and three-quarters of a mile west of post office at Sevier, Sevier County.

RECORDS AVAILABLE.—May 29, 1914, to October 22, 1919; irrigation seasons only. Station discontinued.

GAGE.—Stevens continuous water-stage recorder with outside and inside staff gages.

DISCHARGE MEASUREMENTS.—Made by wading at gage.

CHANNEL AND CONTROL.—Earth section. Wooden weir just below gage. New control installed before irrigation season of 1917.

DIVERSIONS.—Above all diversions from the canal.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation not permanent. Well defined standard rating curve used with shifts to parallel curves. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Records good.

Canal diverts water from left bank of Clear Creek in NW. ¼ sec. 32, T. 25 S., R. 4 W. Water used for irrigation between Sevier and Joseph.

Discharge measurements of Cove canal at Sevier, Utah, during the year ending Sept. 30, 1919.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Ft.	*Sec.-ft.*			*Ft.*	*Sec.-ft.*
Oct. 7	J. J. Sanford	1.37	14.5	July 15	G. H. Russell	1.12	7.7
May 14	Russell and Purton	1.66	20.1	Aug. 4	do	1.06	6.0
29	G. H. Russell	1.53	20.8	27	do	1.00	5.2
June 18	do	1.50	17.6	Sept. 18	do	1.15	9.5

Daily discharge, in second-feet, of Cove canal at Sevier, Utah, for the period Apr. 17 to Oct. 22, 1919.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1		13	19	7	6	8	11
2		14	18	8	6	11	11
3		17	18	7	6	12	12
4		18	18	7	6	11	12
5		18	20	7	6	10	12
6		18	21	7	6	10	11
7		19	19	7	6	10	11
8		21	19	8	7	10	11
9		21	20	7	8	10	11
10		21	19	8	7	10	10
11		21	20	8	6	8	11
12		21	20	8	6	8	11
13		21	19	10	4	8	10
14		21	19	10	3	8	10
15		21	18	8	2	8	10
16		21	18	8	5	10	10
17	8	22	18	8	14	10	10
18	14	22	18	8	14	9	10
19	15	22	18	7	10	10	10
20	12	22	8	7	7	10	9
21	14	22	8	6	6	10	10
22	15	22	7	6	6	10	9
23	15	25	7	6	6	10	
24	15	25	7	6	6	9	
25	14	25	7	6	6	9	
26	13	26	7	6	5	8	
27	12	24	7	5	6	8	
28	12	22	7	6	6	10	
29	11	22	7	7	6	10	
30	12	20	6	6	6	11	
31		20		6	6		

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Monthly discharge of Cove canal at Sevier, Utah, for the period Apr. 17 to Oct. 22, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 17-30	15	8	13.0	361
May	26	13	20.9	1,200
June	21	6	14.4	860
July	10	5	7.1	438
August	14	2	6.4	397
September	12	8	9.5	567
October 1-22	12	9	10.5	460
The period				4,370

MONROE-SOUTH BEND CANAL NEAR JOSEPH, UTAH.

LOCATION.—In sec. 27, T. 25 S., R. 4 W., 200 feet below head of canal and 2 miles south of Joseph, Sevier County.

RECORDS AVAILABLE.—April 18, 1914, to October 31, 1919; irrigation seasons only. Station discontinued.

GAGE.—Stevens continuous water-stage recorder with inside and outside staff gages, on left bank. From April 8, 1918, to May 13, 1919, gage was on right bank half a mile downstream.

DISCHARGE MEASUREMENTS.—Made from highway bridge half a mile below gage.

CHANNEL AND CONTROL.—Earth section. Bed composed of sandy loam.

DIVERSIONS.—Above all diversions from canal.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation permanent at both sites of gage. Rating curves well defined. Operation of water-stage recorder satisfactory except April 18 to May 6, and September 28. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Discharge estimated for periods when recorder was not in operation. Records good.

Canal diverts water from right bank of Sevier River in NW. ¼ sec. 27, T. 25 S., R. 4 W. Water used for irrigation southeast of Joseph.

Discharge measurements of Monroe-South Bend canal near Joseph, Utah, during the year ending Sept. 30, 1919.

[Made by G. H. Russell.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 12	1.78	100	Aug. 2	1.46	63
29	1.47	64	18	1.16	42.0
June 21	1.42	64	27	1.08	36.8
July 9	.18	a.6	Sept. 9	.82	20.3
14	1.52	70	18	.84	21.0

a Discharge estimated.

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Daily discharge, in second-feet, of Monroe-South Bend canal near Joseph, Utah, for the period Apr. 9 to Oct. 31, 1919.

Day.	Apr.	May.	June	July.	Aug.	Sept.	Oct.
1			61	61	66	34	16
2			56	61	66	33	17
3			52	61	66	32	15
4		105	54	61	66	30	13
5			56	61	66	29	12
6			56	61	66	29	12
7		103	56	61	66	28	11
8		99	56	61	66	27	10
9	0	99	57	0	66	20	10
10	0	100	58	0	50	20	9
11	3	94	58	66	39	19	9
12	16	94	58	66	38	19	9
13	34	96	59	66	38	18	9
14	43	97	59	72	38	18	9
15	54	98	59	72	41	22	9
16	53	100	59	72	45	22	8
17	55	96	59	72	43	23	7
18		93	60	72	42	21	6
19	60	93	61	72	41	21	5
20		93	61	72	40	20	4
21		88	62	72	40	20	3
22		84	62	72	39	20	6
23	80	77	61	72	37	14	13
24		72	61	72	36	16	13
25		67	61	72	36	31	13
26		59	61	72	36	19	13
27		59	61	72	36	19	13
28	115	62	61	72	36	18	13
29		67	61	74	36	18	13
30		67	61	68	34	16	13
31		64		66	34		13

Monthly discharge of Monroe-South Bend canal near Joseph, Utah, for the period Apr. 9 to Oct. 31, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 9–30		0	64.2	2,800
May		59	92.0	5,660
June	62	52	58.9	3,500
July	74	0	63.7	3,920
August	66	34	46.7	2,870
September	34	14	22.5	1,340
October	17	3	10.5	646
The period				20,700

SEVIER VALLEY CANAL NEAR JOSEPH, UTAH.

LOCATION.—Near line between secs. 22 and 27, T. 25 S., R. 4 W., at station 20 on canal, 1½ miles south of Joseph, Sevier County.

RECORDS AVAILABLE.—May 18, 1912, to November 11, 1919; irrigation seasons only. Station discontinued.

GAGE.—Stevens continuous water-stage recorder on left bank since May 13, 1913. Original gage, used May 18, 1912, to May 12, 1913, was a vertical staff 10 feet above State weir, in SE. ¼ sec. 15, T. 25 S., R. 4 W.

DISCHARGE MEASUREMENTS.—Made from bridge 600 feet downstream or by wading.

CHANNEL AND CONTROL.—Earth section; concrete weir 20 feet below gage serves as permanent control.

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DIVERSIONS.—Joseph canal diverts from right bank of Sevier Valley canal just above gage.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Records good.

Canal diverts from left bank of Sevier River about 1½ miles south of Joseph, in NW. ¼ sec. 27, T. 25 S., R. 4 W. Water used for irrigation in Sevier Valley as far north as Redmond.

Discharge measurements of Sevier Valley canal near Joseph, Utah, during the year ending Sept. 30, 1919.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Ft.	*Sec.-ft.*			*Ft.*	*Sec.-ft.*
Apr. 18	J. J. Sanford	2.06	23.8	June 22	J. J. Sanford	3.73	223
18	do	3.04	119	28	A. B. Purton	3.84	227
May 6	do	3.81	243	29	do	3.86	241
6	do	4.06	292	July 1	J. J. Sanford	3.88	242
6	do	4.06	291	Aug. 10	do	2.78	88
6	do	4.07	293	22	do	3.65	205
13	A. B. Purton	3.94	255	27	G. H. Russell	3.58	196
June 16	G. H. Russell	3.73	199	Sept. 9	do	2.78	83
21	J. J. Sanford	3.73	219	18	do	2.35	42.7

Daily discharge, in second-feet, of Sevier Valley canal near Joseph, Utah, for the period Apr. 13 to Nov. 11, 1919.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		258	224	248	233	192	51	54
2		254	228	252	235	185	46	14
3		252	231	242	235	182	47	23
4		237	226	244	233	174	52	17
5		226	226	248	233	156	58	39
6		252	226	248	231	144	63	92
7		260	222	246	229	134	63	92
8		260	222	244	228	120	62	92
9		262	222	246	226	94	62	92
10		254	220	242	143	82	61	92
11		256	220	237	69	73	64	92
12		250	220	239	65	70	64	
13	46	252	222	237	64	69	62	
14	37	260	226	239	63	62	63	
15	28	262	222	239	100	46	64	
16	16	256	220	239	213	52	63	
17	15	248	220	241	210	51	63	
18	66	256	220	241	208	47	64	
19	160	252	220	241	206	44	67	
20	160	248	220	242	203	44	70	
21	162	244	220	241	205	41	73	
22	196	248	224	241	206	36	72	
23	231	252	239	239	205	18	69	
24	256	254	242	239	205	24	79	
25	256	233	242	239	205	63	78	
26	272	219	241	239	201	30	80	
27	276	228	241	239	198	32	75	
28	282	231	241	239	196	46	73	
29	272	231	244	239	196	54	75	
30	258	238	246	239	193	53	75	
31		224		233	187		76	

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Monthly discharge of Sevier Valley canal near Joseph, Utah, for the period Apr. 13 to Nov. 11, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 13-30	282	15	166	5,900
May	282	219	247	15,200
June	246	220	228	13,600
July	252	233	241	14,800
August	235	63	188	11,600
September	192	18	80.6	4,800
October	80	46	65.6	4,030
November 1-11	92	17	62.6	1,340
The period				71,400

SEVIER VALLEY CANAL NEAR RICHFIELD, UTAH.

LOCATION.—In SW. ¼ sec. 8, T. 23 S., R. 2 W., at State weir or head of State extension canal, 100 feet below bridge on county road from Richfield to Aurora and 3½ miles northeast of Richfield, Sevier County.

RECORDS AVAILABLE.—May 21, 1912, to November 15, 1919; irrigation seasons only. Station discontinued.

GAGE.—Stevens continuous water-stage recorder on left bank at the weir; installed May 5, 1917, to replace Friez water-stage recorder at same site.

DISCHARGE MEASUREMENTS.—Made from a footbridge about 200 feet below gage or by wading.

CHANNEL AND CONTROL.—Channel in gravel and sandy loam; wooden weir just below gage forms permanent control.

DIVERSIONS.—A number of laterals divert water above the station; water passing the gage is available for the State Piute project.

REGULATION.—Flow controlled by head gates and numerous diversions above.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Water-stage recorder operated satisfactorily except April 23–24 and October 11 to November 15. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Records good.

Discharge measurements of Sevier Valley canal near Richfield, Utah, during the year ending Sept. 30, 1919.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Ft.	*Sec.-ft.*			*Ft.*	*Sec.-ft.*
May 2	J. J. Sanford	2.04	114	June 20	Purton and Sanford	2.26	121
8	do	2.56	161	July 14	J. J. Sanford	2.37	143
8	do	2.56	160	Aug. 29	do	2.36	143
June 13	do	2.27	131				

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Daily discharge, in second-feet, of Sevier Valley canal near Richfield, Utah, for the period Apr. 13 to Nov. 15, 1919.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	115	130	135	154	51	23	
2	.....	108	133	133	147	72	16	
3	.....	105	137	130	156	149	14	
4	.....	125	141	129	150	138	10	25
5	.....	115	132	130	150	116	20	
6	.....	146	141	133	148	104	32	
7	.....	159	141	131	149	107	35	
8	.....	158	142	125	142	100	32	20
9	.....	154	141	133	150	76	29	
10	.....	144	139	139	107	51	32	
11	.....	141	132	126	26	51		20
12	.....	133	134	132	24	50		
13	11	132	133	140	21	51		
14	28	141	139	142	23	46		
15	23	137	133	142	24	31	33	20
16	17	141	132	148	115	30		.....
17	17	135	137	156	143	31		.....
18	17	142	136	154	139	28		.....
19	114	135	134	157	141	12		.....
20	105	132	139	155	142	11	34	.....
21	97	133	135	153	146	11		.....
22	90	136	137	145	148	10		.....
23	104	139	131	145	150	11		.....
24	118	140	138	147	150	2		.....
25	132	136	132	150	148	35		.....
26	151	110	132	157	150	16	30	.....
27	151	123	136	155	145	9		.....
28	160	136	132	156	143	17		.....
29	145	135	143	154	143	25		.....
30	129	139	142	154	141	26		.....
31	.....	138	.....	151	125	.....		.....

Monthly discharge of Sevier Valley canal near Richfield, Utah, for the period Apr. 13 to Nov. 15, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 13–30	160	11	89.4	3,190
May	159	105	134	8,240
June	143	130	136	8,090
July	157	126	143	8,790
August	154	21	124	7,620
September	149	2	48.9	2,910
October	35	10	29.2	1,790
November 1–15	.....	.....	22.3	664
The period	.....	.....	.....	41,300

STATE CANAL NEAR REDMOND, UTAH.

LOCATION.—In W. ½ sec. 14, T. 20 S., R. 1 W., at station 1304 of canal survey, 5 miles north of Redmond, Sevier County.

RECORDS AVAILABLE.—May 10, 1913, to September 30, 1919; irrigation seasons only. Station discontinued.

GAGE.—Stevens continuous water-stage recorder on right bank August 6, 1915, to September 30, 1919; May 10, 1913, to August 5, 1915, vertical staff on right bank.

DISCHARGE MEASUREMENTS.—Made from bridge 10 feet upstream from gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and hardpan; fairly permanent.

DIVERSIONS.—Numerous diversions above gage.

REGULATION.—Flow controlled by head gates and by diversions above.

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ACCURACY.—Stage-discharge relation changed by growth of moss in canal June 21 to July 27. Rating curves used before and after the change fairly well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph; shifting-control method used June 21 to July 27. Records good.

State canal is an extension of Sevier Valley canal. See Sevier Valley canal near Joseph for point of diversion from Sevier River (p. 133).

Discharge measurements of State canal near Redmond, Utah, during the year ending Sept. 30, 1919.

[Made by J. J. Sanford.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Apr. 27	2.00	34.3	June 18	2.28	46.7	Aug. 26	2.07	32.9
May 22	2.06	35.6	July 28	2.49	46.7			
June 3	2.32	45.3	Aug. 21	2.44	43.5			

Daily discharge, in second-feet, of State canal near Redmond, Utah, for the year ending Sept. 30, 1919.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	28	30	45	42	12	16	4	48	39	48	20	17
2	.....	25	29	42	43	0	17	4	40	44	50	32	16
3	.....	22	44	41	43	0	18	4	27	42	46	31	16
4	.....	30	46	39	40	32	19	14	30	38	40	33	15
5	.....	29	39	36	38	16	20	16	29	42	40	40	14
6	.....	30	43	36	40	22	21	12	27	42	43	40	13
7	.....	47	42	38	41	22	22	7	36	42	40	38	13
8	.....	40	48	34	44	71	23	10	40	36	38	34	9
9	.....	40	50	42	59	69	24	10	40	40	37	32	7
10	.....	42	48	45	41	43	25	16	40	43	42	28	5
11	.....	38	40	33	0	20	26	34	34	42	40	29	12
12	.....	34	38	35	0	19	27	44	36	45	39	53	3
13	.....	32	34	46	0	18	28	53	44	45	49	44	2
14	.....	38	37	45	0	18	29	58	40	48	51	43	2
15	.....	45	40	40	0	18	30	48	34	48	43	46	13
							31	.....	34	.....	43	50	.....

Monthly discharge of State canal near Redmond, Utah, for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 16–30	58	4	22.2	660
May	48	22	35.5	2,180
June	50	29	41.5	2,470
July	51	33	41.5	2,550
August	59	0	33.0	2,030
September	71	0	17.9	1,060
The period				11,000

JOSEPH CANAL NEAR JOSEPH, UTAH.

LOCATION.—In SE. ¼ sec. 22, T. 25 S., R. 4 W., 100 yards below head of canal and 1½ miles south of Joseph, Sevier County, on road to Marysvale.

RECORDS AVAILABLE.—April 6, 1914, to October 21, 1919; irrigation seasons only. Station discontinued.

GAGE.—Stevens continuous water-stage recorder, with outside and inside staff gages.

DISCHARGE MEASUREMENTS.—Made by wading.

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CHANNEL AND CONTROL.—Gravel section. Concrete weir 20 feet below gage.
DIVERSIONS.—Above all diversions.
REGULATION.—Flow controlled by head gates.
ACCURACY.—Stage-discharge relation not permanent April 22 to July 2 owing to sand in canal; permanent after July 2. Several poorly defined rating curves used before July 2; rating curve used after July 2 well defined between 6 and 25 second-feet. Operation of water-stage recorder satisfactory except for period April 25 to May 6 when clock was stopped. Daily discharge determined by applying to rating tables mean daily gage height determined from recorder graph by inspection except for periods of shifting control for which shifting-control method was used; and for period when clock was stopped when mean discharge was estimated. Records fair from April 22 to July 2 and good from July 3 to October 21.

Canal diverts water from right bank of Sevier Valley canal in SE. ¼ sec. 22, T. 25 S., R. 4 W. Water used for irrigation in and around Joseph.

Discharge measurements of Joseph canal near Joseph, Utah, during the year ending Sept. 30, 1919.

[Made by G. H. Russell.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 13	2.15	26.4	June 21	1.60	23.3	Aug. 18	1.26	13.9
29	2.46	22.2	July 14	1.42	19.8	27	1.22	14.0
June 18	1.70	23.3	Aug. 2	1.42	20.8	Sept. 9	.96	6.4

Daily discharge, in second-feet, of Joseph canal near Joseph, Utah, for the period Apr. 21 to Oct. 21, 1919.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1			23	14	22	9	18
2			22	20	21	9	16
3			10	21	22	10	17
4		35	0	22	21	10	18
5			0	24	18	10	21
6			20	24	19	9	23
7		33	41	23	20	8	22
8		33	38	22	19	7	23
9		33	35	22	20	8	22
10		39	34	21	14	6	21
11		38	39	21	12	7	23
12		37	40	21	13	9	23
13		35	35	23	12	8	21
14		33	31	21	13	9	23
15		31	31	20	14	10	23
16		30	27	20	12	11	23
17		29	24	20	12	10	22
18		28	23	20	14	9	22
19		28	22	20	14	10	22
20		28	23	22	12	10	23
21	0	27	25	22	12	12	23
22	5	28	27	20	12	12	.....
23	17	29	23	20	12	7	.....
24	20	31	19	19	13	15	.....
25		28	19	19	13	19	.....
26		26	21	19	13	10	.....
27	30	20	21	19	14	12	.....
28		18	18	21	12	16	.....
29		22	18	21	11	19	.....
30		22	18	13	10	19	.....
31	.....	25	.....	14	9	.....	.....

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Monthly discharge of Joseph canal near Joseph, Utah, for the period Apr. 21 to Oct. 21, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 21-30	.....	0	10.1	440
May	39	18	30.4	1,870
June	41	0	24.2	1,440
July	24	13	20.3	1,250
August	22	9	14.7	904
September	19	6	10.7	637
October 1-21	23	16	21.4	893
The period	.....	.....	.....	7,430

WELLS CANAL NEAR JOSEPH, UTAH.

LOCATION.—In SW. ¼ sec. 23, T. 25 S., R. 4 W., three-quarters of a mile below head of canal and 2 miles by wagon road south of Joseph, Sevier County.

RECORDS AVAILABLE.—April 7, 1914, to October 28, 1919; irrigation seasons only. Station discontinued.

GAGE.—Stevens continuous water-stage recorder with inside and outside staff gages.

DISCHARGE MEASUREMENTS.—Made from bridge across flume 20 feet above gage.

CHANNEL AND CONTROL.—Wooden flume about 4½ feet wide. Permanent control is afforded by plank across flume 10 feet below gage.

DIVERSIONS.—None above station.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation permanent during 1919. Rating curve well defined. Operation of water-stage recorder satisfactory except April 28 to May 12 and September 25–28. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Discharge estimated April 28 to May 12 and interpolated September 25–28. Records good.

Canal diverts water from right side of Sevier River in NE. ¼ sec. 27, T. 25 S., R. 4 W., for irrigation near Joseph.

Discharge measurements of Wells canal near Joseph, Utah, during the year ending Sept. 30, 1919.

[Made by G. H. Russell.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
May 29	1.78	20.6
July 14	1.19	8.4
Aug. 27	1.00	6.1

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Daily discharge, in second-feet, of Wells canal near Joseph, Utah, for the period Apr. 10 to Oct. 28, 1919.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1			12	11	8	4	3
2			9	11	8	4	5
3			18	11	8	3	8
4			17	11	7	3	8
5			15	11	6	5	7
6		24	14	11	7	8	4
7			13	11	8	7	2
8			13	11	9	6	2
9			14	18	9	5	3
10	5		14	13	6	5	4
11	4		13	12	6	5	4
12	3		14	12	7	6	4
13	12	22	14	12	7	6	4
14	8	24	14	10	6	6	4
15	7	25	14	8	7	7	5
16	7	28	12	8	5	7	6
17	7	25	12	8	8	7	6
18	6	22	12	8	6	6	6
19	6	23	12	8	6	6	6
20	6	22	12	8	6	6	6
21	7	16	12	8	6	6	6
22	9	12	12	8	5	6	5
23	14	8	11	8	6	4	5
24	22	1	11	8	6	2	6
25	9	1	11	8	6	2	6
26	24	1	11	8	6	2	6
27	20	7	12	9	6	3	6
28		22	12	9	6	3	6
29	23	23	11	9	5	3	.....
30		20	11	5	5	3	.....
31	.....	17	.....	5	5	.....	.....

NOTE.—Braced figures show mean discharge for periods indicated.

Monthly discharge of Wells canal near Joseph, Utah, for the period Apr. 10 to Oct. 28, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 10-30	.....	3	11.7	488
May	28	1	19.6	1,210
June	18	9	12.7	756
July	13	5	9.5	584
August	9	5	6.5	400
September	8	2	4.9	292
October 1-28	8	2	5.1	283
The period	.....	.....	.....	4,010

MONROE CANAL NEAR ELSINORE, UTAH.

LOCATION.—In SW. ¼ sec. 6, T. 25 S., R. 3 W., 1 mile below head of canal and 3½ miles southwest of Elsinore, Sevier County.

RECORDS AVAILABLE.—April 4, 1914, to October 27, 1919; irrigation seasons only. Station discontinued.

GAGE.—Stevens continuous water-stage recorder on left bank, with inside and outside staff gages.

DISCHARGE MEASUREMENTS.—Made by wading.

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CHANNEL AND CONTROL.—One channel at all stages. Bed composed of gravel. Concrete weir with 18-inch flashboards, 15 feet below gage, serves as permanent control.

DIVERSIONS.—Above all diversions.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve well defined. Operation of water-stage recorder satisfactory, except April 27 to May 5. Daily discharge ascertained by shifting-control method, applying to rating table the daily mean gage height determined from recorder graph. Discharge estimated April 27 to May 5. Records good.

Canal diverts water from right bank of Sevier River in NW.¼ sec. 12, T. 25 S., R. 4 W. Water used for irrigation in and around Monroe.

Discharge measurements of Monroe canal near Elsinore, Utah, during the year ending Sept. 30, 1919.

[Made by G. H. Russell.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 29	1.40	59	July 14	1.19	45.7	Aug. 18	0.89	30.0
June 16	1.22	46.9	Aug. 2	1.12	44.8	28	.87	26.2

Daily discharge, in second-feet, of Monroe canal near Elsinore, Utah, for the period Apr. 9 to Oct. 27, 1919.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1			55	48	46	19	16
2			49	48	45	20	14
3		90	52	48	46	18	13
4			55	46	48	21	13
5			54	46	47	19	14
6		90	52	46	47	14	14
7		84	52	28	46	12	14
8		79	55	3	47	14	14
9	1	79	55	44	47	10	14
10	2	79	55	44	40	18	14
11	9	80	54	43	29	14	14
12	18	80	54	43	29	16	14
13	16	80	52	43	29	16	13
14	18	80	49	44	29	16	13
15	22	80	48	46	28	16	11
16	22	80	47	46	28	16	9
17	31	78	47	46	24	16	9
18	62	71	46	46	28	16	10
19	64	72	40	46	30	16	12
20	78	71	41	46	30	16	10
21	78	70	49	46	30	16	8
22	87	63	49	44	28	16	8
23	77	63	49	44	27	14	7
24	82	62	49	44	27	15	5
25	98	61	49	44	28	20	5
26	91	56	48	44	28	20	4
27		57	46	44	28	20	3
28	90	57	48	44	27	18	.....
29		59	48	45	27	16	.....
30		60	48	45	28	17	.....
31	.....	58	.....	45	25	.....	.....

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Monthly discharge of Monroe canal near Elsinore, Utah, for the period, Apr. 9 to Oct. 27, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 9-30	98	1	55.3	2,410
May	.....	56	74.2	4,560
June	55	40	49.8	2,960
July	48	3	43.2	2,660
August	48	24	33.7	2,070
September	21	10	16.5	982
October 1-27	16	3	10.9	585
The period	.....	.....	.....	16,200

ELSINORE CANAL NEAR ELSINORE, UTAH.

LOCATION.—In NW. ¼ sec. 6, T. 25 S., R. 3 W., 300 yards below head of canal and 2½ miles southwest of Elsinore, Sevier County.

RECORDS AVAILABLE.—April 11, 1914, to October 24, 1919; irrigation seasons only. Station discontinued.

GAGE.—Stevens continuous water-stage recorder, with inside and outside staff gages.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Bed composed of gravel. Concrete weir 10 feet below gage.

DIVERSIONS.—Above all diversions from canal.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation permanent during 1919. Rating curve well defined. Operation of water-stage recorder satisfactory except April 14-21, July 30 to August 17, and September 10-13. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Discharge estimated for periods of faulty gage-height record. Records good.

Canal diverts water from left bank of Sevier River just above the Denver & Rio Grande Western Railroad bridge over the river south of Elsinore, in NW. ¼ sec. 6, T. 25 S., R. 3 W. Water used for irrigation in and around Elsinore.

Discharge measurements of Elsinore canal near Elsinore, Utah, during the year ending Sept. 30, 1919.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 13	Russell and Purton	2.22	41.2	Aug. 2	G. H. Russell	[a] 1.56	17.4
29	G. H. Russell	1.93	24.0	18	do	1.56	11.2
July 14	do	1.78	18.2	28	do	1.49	8.7

[a] Inlet pipe partly stopped. Gage height not correct.

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Daily discharge, in second-feet, of Elsinore canal near Elsinore, Utah, for the period May 13 to Oct. 24, 1919.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	May.	June.	July.	Aug.	Sept.	Oct.
1		22	20		9	7	22	26	21	20	10	7	24
2		17	19		9	7	23	26	21	21	9	8	21
3		14	19		9	7	24	24	20	21	9	7	22
4		14	18		8	7	25	24	20	21	9	13	
5		14	18		8	7							
				16			26	22	20	21	9	11	
6		14	18		8	7	27	23	21	20	9	10	
7		13	17		8	11	28	23	21	20	9	8	
8		14	18		8	10	29	25	21	23	9	6	
9		14	17		8	9	30	24	20	20	9	6	
10		19	16		8	9	31	23		20	9		
11		23	16		8	9							
12		22	16		8	9							
13	41	22	16		8	10							
14		22	17	11	8	10							
15		22	19		8	10							
16		21	19		8	11							
17	30	22	19		8	11							
18		22	19	11	7	10							
19		22	19	11	7	13							
20		22	19	10	7	14							
21		21	20	10	7	23							

Monthly discharge of Elsinore canal near Elsinore, Utah, for the period, May 13 to Oct. 24, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 13-31		22	27.4	1,040
June	23	13	19.4	1,150
July	23	16	18.9	1,160
August		9	11.9	732
Septembe	13	6	8.1	482
October 1-24	24	7	11.6	552
The period				5,120

BROOKLYN CANAL NEAR ELSINORE, UTAH.

LOCATION.—In sec. 6, T. 25 S., R. 3 W., a quarter of a mile below head of canal and 2½ miles southwest of Elsinore, Sevier County.

RECORDS AVAILABLE.—April 13, 1914, to October 24, 1919; irrigation seasons only. Station discontinued.

GAGE.—Stevens continuous water-stage recorder on left bank, with outside and inside staff gages.

DISCHARGE MEASUREMENTS.—Made from bridge 75 feet above gage.

CHANNEL AND CONTROL.—Bed composed of gravel. Concrete weir with flashboard 200 feet below gage serves as permanent control.

DIVERSIONS.—Above all diversions from canal.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation permanent during 1919. Rating curve well defined. Operation of water-stage recorder satisfactory except April 15 to May 12 and August 19–28. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Discharge not determined April 15 to May 12; interpolated August 19–28. Records good.

Canal diverts water from right bank of Sevier River near the Denver & Rio Grande Western Railroad bridge over the river south of Elsinore, in sec 6, T. 25 S., R. 3 W. Water used for irrigation east of Elsinore.

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Discharge measurements of Brooklyn canal near Elsinore, Utah, during the year ending Sept. 30, 1919.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 14	Russell and Purton	2.48	55	July 14	G. H. Russell	1.79	25.0
29	G. H. Russell	2.09	38.3	Aug. 2	do	1.70	22.7
June 23	do	1.88	28.3	Sept. 9	do	1.45	13.0

Daily discharge, in second-feet, of Brooklyn canal near Elsinore, Utah, for the period Apr. 9 to Oct. 24, 1919.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1			29	29	22	14	12
2			27	31	22	14	11
3			31	31	22	14	11
4			33	31	21	14	11
5			30	31	21	15	11
6			29	30	21	15	12
7			29	31	21	14	15
8			34	32	21	14	15
9	3		38	31	22	14	15
10	2		35	31	20	13	15
11	4		33	28	15	13	14
12	6		33	27	15	13	11
13	28	54	33	29	16	13	14
14	31	54	29	26	16	13	14
15		54	29	19	17	13	14
16		55	20	16	16	13	14
17		52	29	14	16	13	14
18		46	29	12	16	13	14
19		52	29	10		13	14
20		56	29	9		14	14
21		50	29	13	16	14	14
22		44	29	24		14	13
23		41	28	23		13	13
24		39	28	23		13	12
25		38	28	23		15	
26		33	28	23	15	15	
27		33	29	23		14	
28		33	29	23		13	
29		36	29	24	15	12	
30		35	29	23	14	12	
31		31		23	14		

Monthly discharge of Brooklyn canal near Elsinore, Utah, for the period May 13 to Oct. 24, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 13-31	56	31	44.0	1,660
June	38	27	30.1	1,790
July	32	9	24.0	1,480
August	22	14	17.4	1,070
September	15	12	13.6	809
October 1-24	15	11	13.2	631
The period				7,440

RICHFIELD CANAL NEAR ELSINORE, UTAH.

LOCATION.—In NE. ¼ sec. 6, T. 25 S., R. 3 W., 200 feet below head of canal and 2 miles southwest of Elsinore, Sevier County.

RECORDS AVAILABLE.—April 11, 1914, to October 23, 1919; irrigation seasons only. Station discontinued.

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GAGE.—Stevens continuous water-stage recorder on right bank, with inside and outside staff gages.

DISCHARGE MEASUREMENTS.—Made by wading 75 feet above gage.

CHANNEL AND CONTROL.—Bed composed of gravel and sand. Concrete weir, with removable flashboards, 10 feet below gage, served as control until May 10, 1916, when permanent crest was installed.

DIVERSIONS.—Above all diversions from canal.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Records excellent.

Canal diverts water from left bank of Sevier River a short distance below the Denver & Rio Grande Western Railroad bridge south of Elsinore, in NW. ¼ sec. 6, T. 25 S., R. 3 W. Water used for irrigation in Sevier Valley west of the river, between Elsinore and Richfield.

Discharge measurements of Richfield canal near Elsinore, Utah, during the year ending Sept. 30, 1919.

[Made by G. H. Russell.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 29	2.27	106	Aug. 18	1.75	47.0
July 14	2.00	70	28	1.54	28.6

Daily discharge, in second-feet, of Richfield canal near Elsinore, Utah, for the period Apr. 9 to Oct. 23, 1919.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	.....	91	42	80	70	30	24
2	.....	84	32	80	77	32	31
3	.....	95	60	80	74	35	29
4	.....	105	85	82	70	35	29
5	.....	107	85	81	69	39	28
6	.....	106	79	78	68	38	32
7	.....	109	71	78	65	36	33
8	.....	109	83	86	66	34	33
9	2	108	81	85	67	28	32
10	4	104	77	82	56	18	31
11	23	109	70	70	58	30	32
12	12	114	73	71	51	28	37
13	34	115	80	73	33	26	34
14	43	116	82	73	32	26	33
15	45	120	78	73	55	28	34
16	56	123	73	73	43	28	33
17	67	112	78	72	49	28	32
18	65	94	83	73	48	28	29
19	63	84	82	72	45	28	32
20	74	102	81	71	42	28	36
21	78	93	79	71	38	27	38
22	68	91	79	70	32	26	40
23	73	84	73	70	39	26	38
24	105	80	74	71	38	17	.....
25	61	72	73	70	36	50	.....
26	107	72	73	68	34	39	.....
27	116	71	80	68	33	38	.....
28	91	77	82	69	32	26	.....
29	81	94	80	74	29	19	.....
30	92	91	78	63	29	21	.....
31	.....	72	.....	56	32	.....	.....

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Monthly discharge of Richfield canal near Elsinore, Utah, for the period Apr. 9 to Oct. 23, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 9-30	116	.....	61.8	2,700
May	123	71	96.8	5,950
June	85	32	74.9	4,460
July	86	56	73.6	4,530
August	77	22	48.7	2,990
September	50	17	29.7	1,770
October 1-23	40	24	33.9	1,550
The period	.....	.....	.....	24,000

ANNABELLA CANAL AT ELSINORE, UTAH.

LOCATION.—In NW. ¼ sec. 33, T. 24 S., R. 3 W., 400 yards below head of canal and 1 mile southeast of Denver & Rio Grande Western Railroad station at Elsinore, Sevier County.

RECORDS AVAILABLE.—April 11, 1914, to October 5, 1919; irrigation seasons only. Station discontinued.

GAGE.—Stevens continuous water-stage recorder, with outside and inside staff gages.

DISCHARGE MEASUREMENTS.—Made by wading 150 feet below gage.

CHANNEL AND CONTROL.—Bed composed of sand and gravel. Concrete weir 10 feet below gage serves as primary control.

DIVERSIONS.—Above all diversions from canal.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation permanent during 1919. Rating curve well defined. Operation of water-stage recorder satisfactory, except April 21 to May 12, when no record was obtained. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Records good.

Canal diverts water from right bank of Sevier River in NW. ¼ sec. 33, T. 25 S., R. 3 W. Water used for irrigation in Sevier Valley east of river and below Elsinore.

Discharge measurements of Annabella canal at Elsinore, Utah, during the year ending Sept. 30, 1919.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 13	Russell and Purton	1.12	29.7	Aug. 2	G. H. Russell	0.19	a.02
June 4	G. H. Russell	1.03	24.1	18	do	.77	13.0
28	do	.98	20.7	Sept. 9	do	.67	9.1
July 14	do	.88	17.7				

a Discharge estimated.

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Daily discharge, in second-feet, of Annabella canal at Elsinore, Utah, for the period Apr. 9 to Oct. 5, 1919.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	.....	.....	13	20	26	12	8
2	.....	.....	17	21	3	11	8
3	.....	.....	19	21	18	10	8
4	.....	.....	24	21	17	10	8
5	.....	.....	24	21	17	11	8
6	.....	.....	23	20	17	10	.....
7	.....	.....	16	20	16	10	.....
8	.....	.....	18	22	16	10	.....
9	22	.....	18	22	16	9	.....
10	19	.....	17	21	14	9	.....
11	13	.....	15	18	16	9	.....
12	10	.....	16	18	15	9	.....
13	31	28	17	18	15	9	.....
14	25	29	18	18	15	9	.....
15	22	28	16	18	15	9	.....
16	21	27	22	18	14	9	.....
17	21	24	22	19	14	9	.....
18	19	33	21	17	13	9	.....
19	14	16	18	16	12	9	.....
20	21	22	19	17	12	9	.....
21	.....	22	19	16	12	9	.....
22	.....	22	19	16	12	9	.....
23	.....	20	19	16	12	9	.....
24	.....	21	19	16	12	9	.....
25	.....	21	18	16	12	13	.....
26	.....	21	19	16	12	10	.....
27	.....	21	21	17	12	9	.....
28	.....	22	21	17	12	8	.....
29	.....	31	20	18	11	8	.....
30	.....	29	20	5	11	8	.....
31	.....	19	.....	10	11	.....	.....

Monthly discharge of Annabella canal at Elsinore, Utah, for the period May 13 to Oct. 5, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 13–31	33	16	23.7	883
June	24	13	18.9	1,120
July	22	5	17.7	1,090
August	26	3	13.9	855
September	13	8	9.5	565
October 1–5	8	8	8.0	79
The period	.....	.....	.....	4,600

VERMILION CANAL NEAR RICHFIELD, UTAH.

LOCATION.—In NW. ¼ sec. 32, T. 23 S., R. 2 W., 500 feet below head of canal and 2½ miles east of Richfield, Sevier County.

RECORDS AVAILABLE.—April 10, 1914, to October 19, 1919; irrigation seasons only. Station discontinued.

GAGE.—Stevens continuous water-stage recorder on right bank, with inside and outside staff gages.

DISCHARGE MEASUREMENTS.—Made by wading, or from bridge a quarter of a mile below gage.

CHANNEL AND CONTROL.—Bed composed of sandy loam. Concrete weir 10 feet below gage serves as partial control, but owing to the light grade of the canal, growth of moss and deposits of sand cause changes in the rating.

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DIVERSIONS.—Above all diversions from canal.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation not permanent; affected by growth of moss in canal. Rating curves fairly well defined. Operation of water-stage recorder satisfactory, except April 29 to May 11. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph; shifting-control method used for the year. Discharge estimated April 29 to May 11. Records fair.

Canal diverts water from left bank of Sevier River in NW. ¼ sec. 32, T. 23 S., R. 4 W. Water used for irrigation in Sevier Valley west of the river and northeast of Richfield, toward Vermilion.

Discharge measurements of Vermilion canal near Richfield, Utah, during the year ending Sept. 30, 1919.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 2	J. J. Sanford	1.28	57	July 19	G. H. Russell	1.91	52
May 21	Russell and Purton	1.53	68	Aug. 12	do	1.14	46
June 4	G. H. Russell	1.32	50	21	do	1.12	45
17	do	1.50	43	28	do	1.16	50
28	do	2.09	51	Sept. 25	do	1.02	43
July 11	do	2.03	54				

Daily discharge, in second-feet, of Vermilion canal near Richfield, Utah, for the period Apr. 8 to Oct. 19, 1919.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1			54	59	74	50	38
2			52	64	76	46	38
3			51	66	74	44	40
4			50	64	60	42	43
5			47	66	57	42	49
6		68	49	66	54	44	46
7			47	63	52	42	46
8	0		46	62	52	40	46
9	0		46	65	55	38	46
10	0		46	67	59	43	46
11	0		44	60	58	44	46
12	0	70	41	56	48	42	50
13	0	74	39	56	54	42	50
14	3	65	40	53	52	43	50
15	54	67	42	50	52	42	52
16	55	62	44	52	54	46	51
17	86	63	42	49	53	46	50
18	87	62	44	49	52	42	50
19	74	74	50	50	50	38	52
20	54	76	48	48	45	40	
21	41	68	46	52	43	42	
22	40	70	46	49	44	48	
23	44	68	46	47	46	44	
24	55	67	48	46	52	40	
25	58	66	49	44	50	40	
26	56	64	48	38	49	39	
27	68	62	47	38	50	38	
28	65	60	48	42	50	40	
29	66	59	52	1	49	40	
30	66	58	59	0	46	38	
31		56		46	48		

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Monthly discharge of Vermilion canal near Richfield, Utah, for the period April 8 to Oct. 19, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 8–30	87	0	42.3	1,980
May	76	56	66.4	4,080
June	59	39	47.0	2,800
July	67	0	50.6	3,110
August	76	43	53.5	3,290
September	50	38	42.2	2,510
October 1–19	52	38	46.8	1,760
The period				19,500

ROCKYFORD CANAL NEAR VERMILION, UTAH.

LOCATION.—In sec. 19, T. 22 S., R. 1 W., 300 feet below head of canal and 2 miles northeast of Vermilion, Sevier County.

RECORDS AVAILABLE.—July 8, 1914, to September 30, 1920.

GAGE.—Stevens continuous water-stage recorder on left bank; installed October 18, 1917; inspected by Mrs. Will Barron.

DISCHARGE MEASUREMENTS.—Made from highway bridge 400 feet downstream or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and clay; fairly permanent.

ICE.—No information.

DIVERSIONS.—None above gage. Gage is a short distance below wasteway which returns surplus water to Sevier River.

REGULATION.—Flow controlled by head gates and wasteway.

ACCURACY.—Stage-discharge relation changed frequently. Standard rating curve used with shifts to parallel curves. Operation of water-stage recorder satisfactory except November 25 to December 5, 1918, March 18 to April 1, October 20–25, 1919, November 16, 1919, to January 19, 1920, and April 10–22, 1920. During these periods staff gage was read once a week. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph; shifting-control method used during greater part of time. Discharge estimated for periods of faulty gage-height record. Records fair.

Canal diverts water from Rockyford reservoir, a small reservoir on Sevier River, at Vermilion, in sec. 19, T. 22 S., R. 1 W. Flow dependent on water stored in reservoir and seepage and return waters below Richfield. Water used for irrigation north of Vermilion.

Discharge measurements of Rockyford canal near Vermilion, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 2	J. J. Sanford	1.84	61	Aug. 1	G. H. Russell	2.47	83
Nov. 5	do	1.43	44.2	30	do	2.18	73
13	do	1.50	49.2	Sept. 27	do	2.05	60
1919.				1920.			
Jan. 4	Sanford and Purton	[a] 1.04	20.0	Jan. 20	A. B. Purton	.84	5.9
Apr. 2	A. B. Purton	1.30	26.1	June 14	L. W. Jones [b]	2.35	83
May 21	Russell and Purton	2.50	98	18	R. R. Rowe	2.40	87
June 4	G. H. Russell	2.23	77	July 16	L. W. Jones	2.50	68
17	do	2.34	85	Sept. 13	A. B. Purton	2.53	74
	do	2.04	68	30	do	2.11	60
	do	2.12	74				

[a] Stage-discharge relation affected by ice.

[b] Water commissioner.

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Daily discharge, in second-feet, of Rockyford canal near Vermilion, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	63	44		21	15	22	26	89	80	83	74	62
2	63	44		21	15	22	26	87	81	68	53	54
3	63	44	35	21	15	21	26	84	81	69	51	52
4	65	44		20	15	21	26	83	78	75	50	72
5	65	44		21	15	21	27	88	85	73	50	66
6	54	44	29	21	15	20	29	94	94	71	48	64
7	48	44	28	20	15	19	31	94	93	70	72	70
8	48	44	28	20	16	19	33	84	93	68	79	68
9	48	44	28	20	17	17	34	80	99	71	95	68
10	48	44	28	19	17	17	36	80	96	70	58	68
11	48	44	28	18	17	17	36	80	95	66	60	67
12	48	44	27	17	18	17	36	81	93	63	54	67
13	48	48	26	16	19	18	35	84	92	62	52	68
14	48	48	25	15	19	18	40	96	88	62	50	68
15	48	47	25	15	20	18	43	95	87	61	56	76
16	48	46	25	15	21	18	44	98	86	60	66	79
17	48	46	24	15	22	23	43	97	86	62	65	82
18	48	45	24	15	23		42	98	84	64	74	77
19	48	44	24	15	23		40	97	80	69	64	72
20	48	45	23	15	23		35	98	76	74	67	67
21	48	46	23	15	23	24	38	98	75	70	67	66
22	48	46	23	15	22		42	98	73	71	69	69
23	47	47	23	15	23		54	100	73	71	68	63
24	47	48	23	15	23	25	48	98	73	68	66	62
25	46		23	15	22		56	88	73	69	63	65
26	46		23	15	22	25	96	89	72	67	65	65
27	46	42	23	15	22		96	84	77	63	75	62
28	45		23	15	22		72	77	83	63	71	68
29	45		22	15	.....		73	78	84	62	74	68
30	44		22	15	.....	26	81	81	86	52	72	70
31	44	.....	22	15	.....		.....	80	.....	33	68	.....
1919-20.												
1	69	34		7	7	40	0	82	86	78		76
2	70	34	20	7	7	41	0	81	92	77	75	73
3	73	34		7	7	41	0	83	86	77		73
4	75	32	10		7	41	0	84	56	78	74	72
5	73	34			7	40	0	84	56	78	76	70
6	76	34		7	7	40	0	81	59	77	76	70
7	73	34			7	41	12	78	61	77	76	71
8	70	35	8		7	40	26	77	62	77	78	73
9	58	35			7	37	28	78	67	77	79	75
10	35	35		7	7	36		79	83	77	80	77
11	35	35			7	36		81	80	77	82	79
12	35	35			7	34		85	78	77	86	86
13	34	35	7		7	32	28	83	81	76	85	76
14	34	35		7	7	32		88	86	76	81	85
15	34	35			7	34		88	89	76	79	83
16	34				6	38		82	89	74	80	81
17	35			7	6	39	29	81	87	79	79	82
18	34	35		7	6	39		81	87	78	77	83
19	34			6	22	36		84	88		77	84
20				6	43	35	30	81	89		76	84
21		35	7	6	44	32		82	90	77	76	84
22	34			6	42	30		80	92		76	84
23				6	41	29	30	81	93		77	83
24				6	41	28	44	83	81		78	82
25		35		6	40	27	62	83	7	76	79	84
26	34			7	39	26	70	80	37	76	79	83
27	34			7	39	27	76	77	76	76	80	75
28	34		7	7	39	25	82	73	76	77	80	65
29	33	35		7	39	26	80	73	77		80	58
30	33	30	7	7	.....	12	81	77	79	76	79	59
31	34	.....		7	.....	0	.....	85	.....		76	.....

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Monthly discharge of Rockyford canal near Vermilion, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	65	44	50.0	3,070
November	.....	.....	44.5	2,650
December	.....	22	26.4	1,620
January	21	15	16.9	1,040
February	23	15	19.2	1,070
March	.....	17	21.8	1,340
April	96	26	44.8	2,670
May	100	77	89.0	5,470
June	99	72	83.9	4,990
July	83	33	66.1	4,060
August	95	48	64.4	3,960
September	82	52	67.5	4,020
The year	109	15	49.7	36,000
1919–20.				
October	76	.....	44.7	2,750
November	.....	.....	34.5	2,050
December	.....	.....	8.6	529
January	.....	.....	6.8	418
February	44	6	19.0	1,090
March	41	0	32.7	2,010
April	82	0	32.2	1,920
May	88	73	81.0	4,980
June	93	7	75.7	4,500
July	79	74	76.8	4,720
August	86	74	78.3	4,810
September	86	58	77.0	4,580
The year	93	0	47.4	34,400

SALINA CREEK AT SALINA, UTAH.

LOCATION.—In NW. ¼ sec. 25, T. 21 S., R 1 W., at bridge south of White House Hotel, at Salina, Sevier County, 1 mile above mouth of creek.

DRAINAGE AREA.—298 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 25, 1914, to September 30, 1919, when station was discontinued. July 1 to December 31, 1900, at vertical staff gage about 5 miles southeast of Salina.

GAGE.—Stevens continuous water-stage recorder installed October 17, 1917; inspected by Denwall Dastrup. March 23, 1915, to September 30, 1917, vertical staff gage nailed to right bridge abutment a quarter of a mile south of hotel; April 25, 1914, to March 22, 1915, a vertical staff nailed to right abutment of bridge on depot road in SE. ¼ sec. 23.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel; shifts during extremely high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 3.15 feet at 8 a. m. May 4 (discharge estimated 135 second-feet); creek dry during parts of October, July, August, and September.

1914–1919: Maximum stage recorded, 6.50 feet at 8 p. m. July 22, 1918 (discharge estimated 730 second-feet); creek dry in fall of 1918 and 1919.

ICE.—Stage-discharge relation affected by ice each winter.

DIVERSIONS.—Below all diversions.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent; affected by ice December 1 to February 22. Three rating curves used during year applicable as follows: October 1 to November 30, well defined below 5 second-feet; February 23 to May 1,

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fairly well defined between 10 and 80 second-feet; and May 9 to September 30, fairly well defined below 50 second-feet. Operation of water-stage recorder satisfactory except November 27 to February 22 and August 18 to September 30. During these periods, staff gage was read once a week. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph; shifting-control method used May 2–8. Discharge for period of ice effect estimated from one meter measurement, climatic records, and observer's notes. Discharge interpolated for other periods of no gage-height record. Records fair.

Discharge measurements of Salina Creek at Salina, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 2	J. J. Sanford	1.48	1.1	Apr. 12.	A. B. Purton	2.32	55.0
Nov. 5	do	1.58	2.8	May 26	G. H. Russell	2.04	24.6
1919.				Aug. 1	do	1.50	[b] .8
Jan. 7	A. B. Purton	[a] 2.60	14.5	1920.			
Apr. 2	do	1.96	26.4	June 18	R. R. Rowe	1.19	3.5

[a] Stage-discharge relation affected by ice. [b] Discharge estimated.

Daily discharge, in second-feet, of Salina Creek at Salina, Utah, for the year ending Sept. 30, 1919.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1	1				13	82	77	12	1	1	0
2	1	1				15	53	91	11	1	3	0
3	0	1				14	44	104	8	2	6	0
4	0	1		10		12	38	105	6	2	0	0
5	0	2				11	36	108	4	2	0	0
6	0	3				10	41	96	3	2	0	0
7	1	1		15		11	32	94	2	2	0	0
8	0	3	17			10	32	72	1	2	22	0
9	0	9				10	24	73	1	1	11	1
10	0	8				10	17	63	2	1	3	2
11	0	8				9	22	63	2	1	2	3
12	0	8			16	9	24	52	2	11	1	4
13	0	6				8	25	52	2	11	0	5
14	0	4				8	32	65	2	0	0	6
15	0	5				7	29	61	2	0	0	5
16	0	6				7	36	70	2	0	0	4
17	0	6				9	44	70	2	29	0	4
18	0	5				12	53	66	2	17	0	3
19	0	9		16		14	62	65	2	0	0	2
20	0	10				14	72	60	2	0	0	2
21	0	9				14	82	59	2	0	0	1
22	0	7				14	82	57	2	0	0	0
23	0	5	10		17	15	82	56	2	0	0	0
24	0	9			18	14	77	54	2	0	0	0
25	0	17			18	12	77	45	2	0	0	0
26	0	13			14	14	77	26	2	0	0	0
27	0	14			12	17	72	25	2	0	0	0
28	0	16			11	29	72	26	2	11	0	0
29	0	16			.....	44	77	19	1	8	0	0
30	0	16			.....	53	77	16	1	1	0	0
31	1	.....			.....	67	.....	15	.....	1	0	.....

NOTE.—Braced figures show mean discharge for periods indicated.

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Monthly discharge of Salina Creek at Salina, Utah, for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1	0	0.1	2
November	17	1	7.3	434
December	.....	.....	13.4	824
January	.....	.....	14.8	910
February	.....	.....	15.8	878
March	67	7	16.3	1,000
April	82	17	82.4	3,120
May	108	15	61.5	3,780
June	12	1	2.9	173
July	29	0	3.4	209
August	22	0	1.6	98
September	6	0	1.4	83
The year	108	0	15.9	11,500

WEST VIEW CANAL AT REDMOND, UTAH.

LOCATION.—In NW. ¼ sec. 7, T. 21 S., R. 1 E., 100 yards above bridge where depot road crosses canal, at southeast corner of town of Redmond, Sevier County, three-quarters of a mile below head of canal.

RECORDS AVAILABLE.—April 22, 1914, to October 10, 1919; irrigation seasons only. Station discontinued.

GAGE.—Stevens continuous water-stage recorder on right bank, with inside and outside staff gages.

DISCHARGE MEASUREMENTS.—Made by wading just below gage.

CHANNEL AND CONTROL.—Earth section; wooden submerged weir at head of wooden flume 30 feet below gage acts as nominal control, though filling in of sand behind the weir causes changes in stage-discharge relation.

DIVERSIONS.—Above diversions.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation practically permanent except June 21 to August 8, when diversion dams caused backwater in varying amounts. Rating curve fairly well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph; shifting-control method used June 21 to August 8. Records good.

Canal diverts water from left bank of Sevier River in SW. ¼ sec. 7, T. 21 S., R. 1 E. Water used for irrigation west of river and below Redmond.

Discharge measurements of West View canal at Redmond, Utah, during the year ending Sept. 30, 1919.

[Made by E. A. Porter.[a]]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 3	5.64	26.9	June 19	5.10	13.5	July 18	5.58	22.5
27	5.44	22.4	21	5.48	21.0	Aug. 4	5.14	13.5
June 3	5.19	15.8	July 10	5.31	15.9			

[a] Water commissioner.

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Daily discharge, in second-feet, of West View canal at Redmond, Utah, for the period Oct. 1, 1918, to Oct. 10, 1919.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	31	.....	26	18	16	11	15	25
2	25	.....	26	17	16	12	15	25
3	24	.....	26	17	14	14	16	23
4	21	.....	24	19	11	14	15	21
5	16	.....	23	18	13	11	15	20
6	20	.....	21	26	14	12	16	19
7	28	.....	24	26	13	12	18	20
8	28	.....	25	26	14	13	20	
9	28	.....	24	23	16	16	20	
10	28	.....	26	20	15	14	20	
11	28	.....	21	17	14	11	18	.....
12	28	.....	22	20	16	15	18	.....
13	29	.....	21	22	30	22	21	.....
14	29	.....	25	21	20	22	24	.....
15	28	20	23	21	16	21	22	.....
16	.....	20	26	18	19	19	21	.....
17	.....	20	26	15	25	16	21	.....
18	.....	20	24	14	17	18	21	.....
19	.....	20	22	13	9	18	21	.....
20	.....	18	21	15	10	16	23	.....
21	.....	18	21	19	11	16	22	.....
22	.....	18	20	21	10	16	23	.....
23	.....	18	24	20	11	16	24	.....
24	.....	18	24	18	10	14	24	.....
25	.....	16	24	12	9	14	25	.....
26	.....	15	25	9	9	15	24	.....
27	.....	14	22	12	10	15	24	.....
28	.....	22	19	18	14	17	25	.....
29	.....	27	19	18	24	18	25	.....
30	.....	29	19	19	12	16	26	.....
31	.....	.....	19	.....	15	15	.....	.....

Monthly discharge of West View canal at Redmond, Utah, for the period Oct. 1, 1918, to Oct. 10, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918.				
October 1-15	31	16	26.1	776
1919.				
April 15-30	29	14	19.6	621
May	26	19	22.9	1,410
June	26	9	18.4	1,090
July	30	9	14.6	898
August	22	11	15.5	953
September	25	15	20.7	1,230
October 1-10	25	19	21.3	422

FAYETTE CANAL NEAR CENTERFIELD, UTAH.

LOCATION.—In SW. ¼ sec. 8, T. 20 S., R. 1 E., half a mile below head of canal, 2 miles northwest of Axtel depot, and 4 miles south of Centerfield, Sanpete County.

RECORDS AVAILABLE.—April 21, 1914, to October 8, 1919; irrigation seasons only. Station discontinued.

GAGE.—Stevens continuous water-stage recorder on right bank, with inside and outside staff gages.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Earth section. Wooden flume with crest board at upper end, 50 feet below gage, serves as control.

DIVERSIONS.—Above all diversions from canal.

REGULATION.—Flow controlled by head gates.

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ACCURACY.—Stage-discharge relation not permanent. Crest of control raised 1 foot on June 30, resulting in a free overfall weir; about July 21 upper 6-inch plank of control bulged downstream, allowing water to pass under as well as over the plank; crest of control lowered 0.5 foot on July 26. Rating curve used April 27 to June 17 fairly well defined between 20 and 50 second-feet; curve used June 22–30 and July 26 to October 8 well defined between 15 and 50 second-feet; rating curve expressed by weir formula used July 1–25. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph; indirect method used June 17–31 and July 21–26. Records good.

Canal diverts water from right side of Sevier River in NE. ¼ sec. 18, T. 20 S., R. 1 E., for irrigation near Gunnison and Fayette.

Discharge measurements of Fayette canal near Centerfield, Utah, during the period Oct. 1, 1918, to Oct. 8, 1919.

[Made by E. A. Porter.[a]]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 3	2.84	46.3	Aug. 2	2.62	27.6
27	2.81	47.0	4	2.44	17.4
28	2.32	26.0	Sept. 17	2.46	18.3
June 17	2.39	25.0	Oct. 8	2.97	46.0
23	2.67	30.3			

[a] Water commissioner.

Daily discharge, in second-feet, of Fayette canal near Centerfield, Utah, for the period Oct. 1, 1918, to Oct. 8, 1919.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	42	.....	42	24	24	28	30	36
2	45	.....	42	33	27	28	25	36
3	43	.....	44	32	26	16	22	38
4	44	.....	37	30	24	20	18	42
5	45	.....	30	41	23	20	22	42
6	48	.....	24	40	21	20	33	43
7	49	.....	20	40	19	19	33	44
8	49	.....	20	36	16	20	35	45
9	49	.....	18	36	15	17	35	.....
10	49	.....	33	30	16	13	34	.....
11	48	.....	49	30	17	14	34	.....
12	48	.....	50	29	17	19	33	.....
13	48	.....	50	31	23	22	33	.....
14	49	.....	52	32	24	22	39	.....
15	49	.....	56	30	21	22	30	.....
16	.....	.....	56	28	20	20	20	.....
17	.....	.....	57	28	19	21	18	.....
18	.....	.....	56	34	20	22	16	.....
19	.....	.....	54	27	23	20	15	.....
20	.....	.....	52	13	22	18	16	.....
21	.....	.....	50	23	25	18	15	.....
22	.....	.....	47	30	25	18	14	.....
23	.....	.....	49	30	24	17	20	.....
24	.....	.....	50	28	24	17	38	.....
25	.....	.....	49	24	24	23	36	.....
26	.....	.....	47	24	37	24	38	.....
27	.....	10	40	22	37	21	37	.....
28	.....	11	28	5	37	22	40	.....
29	.....	28	30	5	35	24	39	.....
30	.....	37	28	18	30	28	36	.....
31	.....	.....	26	.....	28	26	.....	.....

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Monthly discharge of Fayette canal near Centerfield, Utah, for the period Oct. 1, 1918, to Oct. 8, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918.				
October 1-15	49	42	47	1,400
1919.				
April 27-30	37	10	21.5	171
May	57	18	41.5	2,550
June	41	5	27.8	1,650
July	37	15	23.9	1,470
August	28	13	20.4	1,250
September	40	14	28.3	1,680
October 1-8	45	36	40.8	647

DOVER CANAL NEAR GUNNISON, UTAH.

LOCATION.—On line between secs. 23 and 24, T. 19 S., R. 1 W., half a mile below head of canal and 3½ miles west of Gunnison, Sanpete County.

RECORDS AVAILABLE.—April 21, 1914, to October 10, 1919; irrigation seasons only. Station discontinued.

GAGE.—Stevens continuous water-stage recorder on left bank, with inside and outside staff gages.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Earth section. Canal carries large quantities of silt and has very low grade. A submerged weir, 30 feet below gage, serves as control, but stage-discharge relation is at times affected by backwater from below the weir.

DIVERSIONS.—Above all diversions from canal.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation changed several times owing to manipulation of the flashboards below gage and to growth of moss. Rating curves poorly defined. Operation of water-stage recorder satisfactory except May 12-26. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Records poor.

Canal diverts water from left bank of Sevier River in the SW. ¼ sec. 24. T. 19 S., R. 1 W., about 1½ miles above confluence of San Pitch and Sevier rivers. Water used for irrigation.

Discharge measurements of Dover canal near Gunnison, Utah, during the year ending Sept. 30, 1919.

[Made by E. A. Porter.[a]]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 3	1.63	18.8	June 11	1.56	21.6	July 8	1.32	15.8
27	1.76	20.1	28	1.80	24.4	29	1.40	14.8

[a] Water commissioner.

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Daily discharge, in second-feet, of Dover canal near Gunnison, Utah, for the period Oct. 1, 1918, to Oct. 10, 1919.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	19	.....	26	18	4	24	26	23
2	22	.....	19	18	3	21	24	22
3	20	.....	20	14	28	21	20	23
4	20	.....	18	20	18	17	20	24
5	20	.....	16	25	15	17	25	10
6	23	.....	16	18	15	18	20	10
7	22	.....	16	18	15	22	21	10
8	20	.....	16	17	17	22	26	10
9	17	.....	20	17	17	28	28	10
10	17	.....	26	17	17	33	26	10
11	16	.....	25	21	16	18	26	.....
12	16	.....	24	20	21	18	25	.....
13	16	.....	24	20	25	18	22	.....
14	15	.....	23	22	20	17	14	.....
15	.....	.....	23	20	20	16	0	.....
16	.....	.....	22	20	20	16	7	.....
17	.....	.....	22	18	25	14	10	.....
18	.....	.....	22	22	23	17	12	.....
19	.....	.....	21	18	20	18	11	.....
20	.....	.....	21	20	20	16	14	.....
21	.....	.....	21	17	21	15	18	.....
22	.....	.....	20	5	22	15	22	.....
23	.....	.....	20	0	22	20	23	.....
24	.....	.....	21	0	21	29	18	.....
25	.....	.....	21	0	20	26	22	.....
26	.....	.....	21	11	19	15	22	.....
27	.....	.....	21	23	18	15	22	.....
28	.....	12	21	24	16	17	26	.....
29	.....	20	20	21	20	17	25	.....
30	.....	13	18	17	20	20	24	.....
31	.....	.....	19	.....	19	25	.....	.....

Monthly discharge of Dover canal near Gunnison, Utah, for the period Oct. 1, 1918, to Oct. 10, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918.				
October 1-14	23	15	18.8	522
1919.				
April 28-30	20	12	15.0	89
May	26	16	20.7	1,270
June	25	0	16.7	994
July	25	3	18.5	1,140
August	33	14	19.5	1,200
September	36	0	21.2	1,260
October 1-10	26	10	15.5	307

SEVIER RIVER LAND & WATER CO.'S CANAL NEAR LEAMINGTON, UTAH.

LOCATION.—In sec. 28, T. 14 S., R. 3 W., 250 feet below head of canal, half a mile above old Parley siding on Los Angeles & Salt Lake Railroad, and 7 miles northeast of Leamington, Millard County.

RECORDS AVAILABLE.—April 21, 1914, to October 17, 1919; irrigation seasons only. Station discontinued.

GAGE.—Stevens continuous water-stage recorder on right bank, 50 feet above second tunnel. Also inside and outside staff gages.

[illegible]UREMENTS.—Made from footbridge 400 feet above gage or by wading.

[illegible]NTROL.—Bed composed of gravel and clay. Sill of tunnel serves as

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ICE.—Canal freezes over during the winter when water is usually being diverted for storage in Fool Creek reservoir.

DIVERSIONS.—None above station from this canal.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation changed four times during 1919. Rating curve used October 1, 1918, to March 8, 1919, well defined above 30 second-feet; curve used April 9 to July 20, well defined; curves used July 21 to August 30 and September 1 to October 17, 1919, poorly defined. Operation of water-stage recorder satisfactory except during winter, when staff gage was read about once a week. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Discharge November 17 to April 8 estimated from staff gage readings and observer's notes. Records good except those for winter period which are fair, and for low stages in September which are poor.

Canal diverts water from left bank of Sevier River just below reservoir, in SE. ¼ sec. 23, T. 14 S., R. 3 W. Water used for irrigation and for storage in Fool Creek reservoir.

Discharge measurements of Sevier River Land & Water Co.'s canal near Leamington, Utah, during the period Oct. 1, 1918, to Oct. 17, 1919.

[Made by E. A. Porter.[a]]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1918.	*Feet.*	*Sec.-ft.*	1919.	*Feet.*	*Sec.-ft.*	1919.	*Feet.*	*Sec.-ft.*
Oct. 2	2.64	32.4	May 25	6.76	355	Oct. 17	2.35	37.4
1919.			Aug. 21	2.88	49.0			
Apr. 12	4.12	144						

[a] Water commissioner.

Daily discharge, in second-feet, of Sevier River Land & Water Co.'s canal near Leamington, Utah, for the period Oct. 1, 1918, to Oct. 17, 1919.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	11	38	40				0	75	224	272	139	85	28
2	33	38	38				0	76	204	263	133	69	34
3	24	37	36				0	76	222	262	121	49	42
4	0	37	34				0	76	249	266	120	42	56
5	0	38	32		38		0	102	264	271	122	36	53
6	0	38	31				0	126	246	274	125	36	46
7	0	38				40	0	125	246	271	108	34	42
8	0	38			39		0	171	238	268	66	34	39
9	0	38					44	210	222	268	60	34	36
10	0	38	30				48	210	239	268	56	29	42
11	0	38			40		69	211	242	271	54	20	39
12	0	38		28			130	212	234	244	54	20	38
13	0	38				0	68	218	237	174	52	18	38
14	0	38	30			0	94	236	242	174	52	18	42
15	0	38			46	0	71	275	245	174	52	18	40
16	26	38				0	65	302	242	174	52	18	38
17	59		30			0	53	345	230	174	52	18	37
18	43					0	49	264	232	173	52	18	.....
19	40					0	47	129	234	173	52	18	.....
20	43					0	48	143	235	174	52	16	.....
21	43		30			0	69	288	235	160	61	12	.....
22	43	38			42	0	142	300	236	166	83	12	.....
23	41					0	77	298	234	169	83	12	.....
24	40					0	54	332	233	169	84	16	.....
25	40			25		0	55	363	233	144	84	19	.....
26	39		30			0	55	365	254	128	85	19	.....
27	38					0	55	363	275	128	88	24	.....
28	38			25	40	0	54	167	276	131	92	30	.....
29	38	43			.....	0	60	165	276	138	93	30	.....
30	39	45			.....	0	72	296	276	139	95	30	.....
31	38	.....		38	.....	0	.....	232	.....	138	91	.....	.....

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Monthly discharge of Sevier River Land & Water Co.'s canal near Leamington, Utah, for the period Oct. 1, 1918, to Oct. 17, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	59	0	23.1	1,420
November	45	37	38.3	2,280
December	40	.....	31.0	1,910
January	.....	.....	27.7	1,700
February	.....	.....	40.5	2,250
March	.....	0	15.5	953
April	142	0	49.3	2,930
May	365	75	218	13,400
June	276	204	242	14,400
July	274	128	200	12,300
August	139	52	81.1	4,990
September	85	12	27.8	1,650
The year	365	0	83.1	60,200
1919.				
October 1-17	68	24	40.1	1,350

LEAMINGTON CANAL NEAR LEAMINGTON, UTAH.

LOCATION.—In SW. ¼ sec. 32, T. 14 S., R. 3 W., 200 feet below head of canal and 6 miles northeast of Leamington, Millard County.

RECORDS AVAILABLE.—April 20, 1914, to September 30, 1919; irrigation seasons only; miscellaneous measurements in 1913. Station discontinued.

GAGE.—Stevens continuous water-stage recorder on right bank, with inside and outside staff gages; inspected by Wells Nielson.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge 150 feet below gage.

CHANNEL AND CONTROL.—Bed composed of gravel. Concrete wall, about 6 feet below gage serves as control but gravel fills in at times between gage and control, causing changes in stage-discharge relation. Growth of moss in canal below control causes backwater at times, except for low stages.

DIVERSIONS.—Above all diversions from canal.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-dischafge relation permanent during 1919. Rating curve well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Canal dry September 18–30.

Canal diverts water from left bank of Sevier River, in SW. ¼ sec. 32, T. 14 S., R. 3 W. Water used for irrigation around Leamington, east of river.

Discharge measurements of Leamington canal near Leamington, Utah, during the year ending Sept. 30, 1919.

[Made by E. A. Porter.a]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
.....	2.20	42.0
.....	1.72	18.0
.....	1.74	17.3

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Daily discharge, in second-feet, of Leamington canal near Leamington, Utah, for the year ending Sept. 30, 1919.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	27	16	12	18	18	16	.....	25	16	18	15	20
2	.....	28	14	11	18	17	17	.....	26	16	10	16	9
3	.....	0	12	11	18	16	18	.....	26	17	10	18	0
4	.....	0	13	19	18	16	19	.....	25	17	10	20	0
5	.....	0	14	23	16	16	20	.....	26	19	12	22	0
6	.....	0	16	24	15	16	21	.....	26	23	15	21	0
7	.....	20	16	20	16	20	22	12	21	22	12	19	0
8	.....	21	15	23	16	22	23	24	17	18	13	20	0
9	.....	22	13	23	16	23	24	32	16	18	14	22	0
10	.....	23	12	23	16	23	25	29	17	18	13	22	0
11	.....	24	13	22	14	23	26	30	18	18	15	22	0
12	.....	24	6	22	10	23	27	27	22	16	14	22	0
13	.....	24	0	23	16	23	28	29	22	15	16	22	0
14	.....	24	6	24	15	20	29	30	21	14	17	24	0
15	.....	24	16	24	15	20	30	31	17	14	17	26	0
							31	.....	18	.....	18	21	.....

Monthly discharge of Leamington canal near Leamington, Utah, for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 22-30	32	12	27.1	484
May	28	0	19.5	1,200
June	23	0	14.8	881
July	24	10	17.0	1,050
August	26	10	18.4	1,130
September	23	0	10.8	644
The period	.....	.....	.....	5,390

CANAL A NEAR DELTA, UTAH.

LOCATION.—In SE. ¼ sec. 26, T. 16 S., R. 6 W., a quarter of a mile below head gates and 8 miles northeast of Delta, Millard County.

RECORDS AVAILABLE.—April 14, 1912, to October 15, 1919; irrigation seasons only. Station discontinued.

GAGE.—Stevens continuous water-stage recorder on right bank a quarter of a mile below headgates since April 15, 1918, replacing Gurley printing register installed March 14, 1913; inclined staff gage at same site and datum, April 14, 1912 to March 14, 1913.

DISCHARGE MEASUREMENTS.—Made from cable about 80 feet below gage or by wading.

CHANNEL AND CONTROL.—Channel uniform earth section. No well-defined control. Silt, moss, and weeds cause backwater at times.

DIVERSIONS.—No diversions between head gates and gage.

REGULATION.—Flow regulated at head gates.

ACCURACY.—Stage-discharge relation changed during winter; affected during summer by moss. Rating curves well defined. Operation of water-stage recorder satisfactory, except for periods noted below. Daily discharge ascertained by applying to rating table, either directly or by shifting-control methods, the daily mean gage height determined from recorder graph, except for June 11-18, and July 23-30 when head gates were closed and only seepage through gates passed the gage. Discharge August 1-5 estimated because recorder was out of order. Records good. No record for the winter.

Canal diverts water from Sevier River in SE. ¼ sec. 26, T. 16 S., R. 6 W., and is used jointly by Delta Land & Water Co. and Melville Irrigation Co. About 6 miles below gage the canal divides into canal B, which serves north side tract of the Delta Land & Water Co., and canal C, which serves Melville Irrigation Co. Canal C will later be enlarged to serve south tract of the Delta Land & Water Co. Waste waters only are returned to the river.

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BEAVER RIVER BASIN.

BEAVER RIVER NEAR BEAVER, UTAH.

LOCATION.—In SE. ¼ sec. 13, T. 29 S., R. 7 W., half a mile above city diversion dam at mouth of canyon and 3 miles above Beaver, Beaver County.

DRAINAGE AREA.—82 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 15 to September 26, 1906; March 15, 1914, to September 30, 1920.

GAGE.—Stevens continuous water-stage recorder on right bank used since November 14, 1914; inspected by G. W. Valentine. Also inside float and outside vertical staff gages.

DISCHARGE MEASUREMENTS.—Made from footbridge 70 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of boulders and coarse gravel; somewhat shifting. One channel; left bank subject to overflow at extremely high stages.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 4.87 feet at 10.30 p. m. May 4 (discharge, 368 second-feet); minimum stage recorded, 2.70 feet at 10 a. m. February 24 (discharge, 10 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 6.02 feet at 9 p. m. May 30 (discharge, 760 second-feet); minimum discharge probably less than 13 second-feet in early March.

1914–1920: Maximum stage from water-stage recorder, 6.02 feet at 9 p. m. May 30, 1920 (discharge, 760 second-feet); minimum stage, 2.57 feet, January 28, 1916 (discharge, 8 second-feet).

ICE.—Stage-discharge relation seriously affected each winter.

DIVERSIONS.—Above all irrigation diversions. Above the station is a small storage reservoir known as Cants Lake. Water is diverted by the Beaver River Power Co. but is returned to the stream several miles above station.

REGULATION.—Flow probably not affected by operation of Beaver River Power Co.'s plant, but is somewhat affected by the Cants Lake storage reservoir.

ACCURACY.—Stage-discharge relation changed slightly several times; affected by ice December 1–5, December 14, 1918, to January 13, 1919, and during parts of December, 1919, and January, 1920. Rating curves used October 1 to December 31, 1918, and January 1 to December 31, 1919, well defined between 20 and 200 second-feet; curve used January 1 to May 31, 1920, fairly well defined; and curves used June 1 to September 30, 1920, well defined for range which occurred in stage. Operation of water-stage recorder satisfactory except for periods indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table daily mean gage height determined from recorder graph by inspection. Records good.

Discharge measurements of Beaver River near Beaver, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Nov. 9	J. J. Sanford	2.87	21.2	June 5	J. L. Mess [b]	3.53	76
Dec. 14	L. W. Jordan	[a] 3.12	22.4	Aug. 15.	A. B. Purton	2.95	23.8
1919.				1920.			
Jan. 8	L. W. Jordan	[a] 3.62	19.6	Apr. 14	Dickinson and Lewis [b].	3.14	31.1
Mar. 19	Purton and Mess	2.94	21.4	21	W. E. Dickinson	3.16	34.0
May 19	A. B. Purton	4.12	171	June 23	Dickinson and Lewis	3.90	108
				Sept. 21	A. B. Purton	3.15	28.8

[a] Stage-discharge relation affected by ice.
[b] Hydrographer for Beaver County Irrigation Co.

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Daily discharge, in second-feet, of Beaver River near Beaver, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	26	24	24		20	18	47	207	95	46	29	26
2	26	24	24		20	16	56	256	89	46	32	29
3	27	24	24		18	17	54	299	85	42	31	27
4	49	24	24	18	18	16	50	305	82	40	27	26
5	35	24	24		18	16	51	294	77	39	25	23
6	33	25	24		18	17	53	256	73	38	26	22
7	32	25	27		17	18	43	272	72	37	26	23
8	32	25	23	20	18	17	38	261	73	39	27	28
9	30	25	24		18	18	33	230	70	39	29	30
10	30	27	20		18	19	32	211	68	38	25	24
11	29	28	24	20	18	20	41	211	78	38	24	21
12	30	28	26		18	20	55	228	73	39	24	22
13	27	29	23		16	19	55	221	70	40	24	21
14	27	30	22	20	18	19	55	233	67	40	22	22
15	29	32		22	17	18	58	212	65	38	22	25
16	29	27		20	18	18	62	221	62	39	24	26
17	28	21		21	18	20	89	207	60	41	29	25
18	26	27		19	18	28	101	200	58	40	31	24
19	26	26		19	18	22	98	189	55	33	26	25
20	27	24		18	17	22	120	173	53	30	23	24
21	27	24		18	18	24	148	169	53	29	22	21
22	26	24		18	18	22	175	160	54	29	22	21
23	26	22	22	18	16	23	189	160	53	29	21	22
24	24	24		18	16	25	191	152	52	29	22	22
25	26	24		20	16	25	191	143	51	27	22	23
26	26	24		20	16	27	156	136	49	27	22	22
27	24	24		20	16	30	132	137	48	26	25	26
28	24	24		22	16	31	124	141	46	28	23	28
29	24	24		20	.....	29	130	143	46	29	22	28
30	24	24		20	.....	38	167	132	45	26	22	27
31	24	.....		20	.....	43	.....	107	.....	25	22	.....
1919–20.												
1	21	23	27		17			101	508	91	49	31
2	24	23	28	19			17	104	427	88	57	30
3	24	24	26					101	377	89	64	30
4	24	25	23	20		14	16		364	99	54	31
5	22	25	23		17				350	95	48	33
6	24	22	22					131	337	91	47	31
7	26	22				13	20		325	88	51	32
8	22	25			17				310	82	53	30
9	24	24						161	288	81	47	31
10	21	24				16		161	253	78	42	30
11	21	24			16		30		223	76	40	28
12	23	22					30		210	75	38	29
13	26	23					30	156	196	71	37	27
14	26	22				17	30			70	36	28
15	26	23	18	15	15					70	33	28
16	26	23			16			150	166	70	34	27
17	26	24			16	18	32	200		70	32	30
18	24	24						348		67	36	27
19	20	25						497		64	44	26
20	19	27			16			534	137	61	56	27
21	21	23				20	29	567	132	60	38	27
22	21	24	19		17		25	552	124	62	35	27
23	22	25	19				25	537	115	62	34	30
24	21	25	18				24	552	117	62	34	30
25	19	27	18	17	15	19	22	560	110	61	42	31
26	22	29					24	556	105	56	39	30
	21	18					27	567	117	55	36	26
	22	19	18	17		18	37	590	104	58	35	27
	26	22			14		57	599	101	55	33	25
	25	24			.....	17	82	608	93	55	33	24
	24	.....			.....		.....	613	.....	50	32	.....

gage read once a week during following periods when water-stage recorder did not operate ct. 27 to Nov. 8 and Nov. 25–30, 1918, Mar. 12–15, Dec. 7, 1919, to Apr. 20, May 4–8, 11–15. 5. 12, 14–19, and 22, 1920; discharge estimated or interpolated. Discharge, Dec. 1–5 and . 13, 1919, estimated because of ice on basis of 2 current-meter measurements, weather r's notes: Dec. 6, 1919, to Jan. 24, 1920, except Dec. 22–25 and Jan. 4, estimated because n with records for other stations. Braced figures show mean discharge for periods

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Monthly discharge of Beaver River near Beaver, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	49	24	28.2	1,730
November	32	21	25.2	1,500
December	27	.....	22.8	1,400
January	22	.....	19.3	1,190
February	20	16	17.5	972
March	43	16	22.4	1,380
April	191	32	93.1	5,540
May	305	107	202	12,400
June	95	45	64.1	3,810
July	46	25	35.0	2,150
August	32	21	24.9	1,530
September	30	21	24.3	1,450
The year	305	16	48.5	35,100
1919-20.				
October	26	19	23.0	1,410
November	29	18	23.7	1,410
December	28	.....	19.4	1,190
January	.....	.....	16.0	984
February	.....	.....	15.4	886
March	.....	.....	16.5	1,010
April	82	.....	26.4	1,690
May	613	101	326	20,000
June	508	93	214	12,700
July	99	50	71.4	4,390
August	64	32	41.6	2,563
September	33	24	28.8	1,710
The year	613	.....	68.9	50,000

BEAVER RIVER AT ADAMSVILLE, UTAH.

LOCATION.—In S. ½ sec. 30, T. 29 S., R. 8 W., 100 yards below highway bridge on road from Milford to Beaver, a quarter of a mile above mouth of Indian Creek, and three-quarters of a mile south of Adamsville, Beaver County.

DRAINAGE AREA.—272 square miles (measured on topographic maps).

RECORDS AVAILABLE.—December 16, 1913, to September 30, 1920.

GAGE.—Stevens continuous water-stage recorder on right bank; installed March 13, 1914; inspected by W. A. Rees. Also inside hook and outside vertical staff gages.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Bed composed of fine gravel. Concrete control constructed July 11, 1916, and rebuilt September 26, 1919. Stage of zero flow 1.15 feet September 29, 1919. Banks low; covered with willows; subject to overflow at extremely high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 2.57 feet from 5 to 8 a. m. May 5 (discharge, 147 second-feet); minimum stage 1.04 feet at 3 p. m. July 9 (discharge, 0.3 second-foot).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 4.85 feet at 6 a. m. May 23 (discharge, 796 second-feet); minimum stage from water-stage recorder, 1.29 feet on July 14 (discharge, 0.9 second-foot).

1914–1920: Maximum stage from water-stage recorder, 4.85 feet at 6 a. m. May 23, 1920 (discharge, 796 second-feet); minimum stage from water-stage recorder, 1.04 feet at 3 p. m. July 9, 1919 (discharge, 0.3 second-foot).

ICE.—Stage-discharge relation affected by ice for short periods.

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DIVERSIONS.—No diversions between the station and the storage reservoir of the Beaver County Irrigation Co. There are a number of ditches above the station supplying the Adamsville and Beaver districts.

REGULATION.—Low-water flow affected by irrigation diversions.

ACCURACY.—Stage-discharge relation practically permanent except for change caused by repair of concrete control September 24–26, 1919; affected by ice November 26 to December 4, December 13, December 22, 1918, to January 30, 1919, November 28, 1919, to January 3, 1920, January 7–19, and February 9–14, 1920. Rating curves well defined. Staff gage read to hundredths twice a week. Water-stage recorder operated satisfactorily except October 1 to November 8, and December 1–4, 1918, February 3, 4, 25–27, April 10, 11, September 24–30, and November 16–19, 1919, and January 25–27, 1920. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Discharge prior to December 12, 1919, for periods when recorder was not in operation and periods of ice effect, determined from staff gage readings and by comparison with flow of Beaver River below Rockyford dam, as reservoir was empty and gates open; for periods after that date, estimated from climatic records, or interpolated. Records good.

COOPERATION.—Nineteen discharge measurements furnished by Beaver County Irrigation Co.

Discharge measurements of Beaver River at Adamsville, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Nov. 9	J. J. Sanford	1.72	33.1	Apr. 14	Dickinson and Lewis	1.82	44.5
Dec. 14	L. W. Jordan	1.98	62	21	W. E. Dickinson	1.85	45.8
1919.				21	do	1.94	60.1
Jan. 8	do	[a] 2.44	28.2	May 1	M. P. Lewis [b]	2.49	128
Mar. 19	A. B. Purton	1.90	54	8	do	2.17	89
May 13	J. L. Mess [b]	1.91	51	23	do	4.66	747
19	A. B. Purton	1.90	56	29	do	4.41	632
20	J. L. Mess	1.58	20	June 5	do	3.18	283
June 5	do	1.28	2.7	19	do	1.61	18.9
7	do	1.39	7.3	23	Dickinson and Lewis	1.44	8.7
Aug. 15	A. B. Purton	1.20	1.0	July 10	M. P. Lewis	1.35	2.7
Sept. 20	J. L. Mess	1.29	.9	31	do	1.58	17.2
Oct. 11	do	1.41	4.4	Aug. 14	do	1.75	31.9
25	do	1.35	2.8	Sept. 21	A. B. Purton	1.48	10.0
Nov. 1	do	1.46	7.8				
8	do	1.53	11.4				
24	do	1.72	29.4				

[a] Stage-discharge relation affected by ice.
[b] Hydrographer for Beaver County Irrigation Co.

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Daily discharge, in second-feet, of Beaver River at Adamsville, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	8	22	45	18	39	45	52	37	9	1	2	6
2	8	23	44	20	38	41	52	72	9	.9	2	5
3	10	23	46	24	35	40	59	112	8	.8	2	5
4	15	23	48	27	38	41	53	136	6	.8	2	4
5	16	27	57	30	38	41	52	137	3	.8	2	1
6	14	28	59	29	39	42	82	104	4	.7	2	1
7	13	28	32	28	39	41	74	100	7	.4	2	.9
8	13	32	70	28	37	43	64	100	6	.3	2	1
9	13	32	60	28	37	40	52	87	5	.3	3	2
10	14	37	54	32	41	42	56	77	5	.3	3	1
11	13	37	50	37	44	42	60	64	5	.3	3	1
12	12	37	49	35	40	46	64	64	6	.3	1	1
13	13	39	50	32	40	58	58	49	6	.4	1	.8
14	15	42	50	30	41	49	62	59	5	.4	1	.8
15	18	42	48	30	39	43	51	46	5	.5	1	.9
16	19	43	48	33	38	45	50	34	5	.8	1	1
17	20	40	50	37	38	46	46	33	4	1	2	1
18	20	39	48	45	38	52	58	28	4	1	3	.9
19	20	38	48	45	39	62	46	23	4	1	3	.8
20	19	36	51	45	40	46	40	18	3	1	2	.9
21	20	33	48	42	41	57	62	12	3	1	3	.8
22	21	32	45	41	45	60	73	10	3	1	3	.8
23	22	32	44	44	42	54	85	10	2	1	4	1
24	22	34	40	44	43	49	82	8	2	1	4	1
25	23	33	27	43	43	48	77	10	1	1	4	1
26	23	32	23	37	43	49	53	10	1	1	4	.9
27	23	34	23	36	43	48	45	8	1	1	4	.9
28	25	35	35	36	43	48	41	8	1	1	4	.9
29	24	38	44	36	.....	48	30	8	1	2	4	.9
30	22	40	37	32	.....	52	22	7	1	2	4	.9
31	22	.....	32	39	.....	52	.....	9	.....	2	3	.....
1919-20.												
1	1	9			57	34	31	124	617	4	50	9
2	1	12		40	57	41	31	121	518	5	163	8
3	1	12			57	38	26	120	435	6	158	6
4	1	12		38	50	32	24	70	354	6	91	6
5	2	13		40	45	33	24	82	287	6	63	6
6	2	13		42	44	33	24	59	277	5	49	6
7	2	12			41	32	23	67	277	4	59	6
8	3	17			36	29	32	84	226	4	63	6
9	3	29				31	33	81	197	4	51	6
10	3	29				32	42	96	168	3	38	6
11	3	29			37	34	49	92	136	2	37	7
12	3	27				28	46	77	112	2	37	7
13	3	27		40		27	44	64	92	1	36	7
14	3	26				25	44	63	78	1	33	10
15	3	27			44	26	54	57	53	1	31	13
16	3	28	40		46	27	54	50	49	1	26	13
17	3	29			46	26	64	74	42	1	23	14
18	3	30			44	37	64	152	31	3	22	12
19	3	31			40	37	54	292	24	3	20	12
20	3	32		44	42	38	50	456	11	2	28	11
21	3	32		45	41	33	55	549	11	1	23	10
22	4	32		49	44	27	54	610	10	2	19	9
23	4	32		53	41	33	44	729	7	36	17	9
24	4	32		48	38	37	38	698	4	88	17	10
25	6	32		50	33	29	36	688	4	42	17	12
26	7	34		51	33	26	32	667	3	26	17	14
27	7	21		52	33	29	31	657	4	22	16	19
28	7			54	32	32	29	633	4	15	14	20
29	7	30		55	32	29	41	633	4	14	14	21
30	7			55	.....	26	59	637	4	16	13	22
31	7	.....		53	.....	24	.....	647	.....	18	12	.....

NOTE.—Braced figures show mean discharge for periods indicated.

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Monthly discharge of Beaver River at Adamsville, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	25	8	17.4	1,070
November	43	22	33.7	2,010
December	82	23	46.9	2,880
January	45	18	34.3	2,110
February	45	35	40.0	2,220
March	62	40	47.4	2,910
April	85	22	56.7	3,370
May	137	7	47.7	2,930
June	9	1	4.2	248
July	2	.3	.87	53
August	4	1	2.6	160
September	6	.8	1.50	89
The year	137	.3	27.7	20,000
1919-20.				
October	7	1	3.6	222
November	34	9	25.0	1,490
December	.....	.....	40.0	2,460
January	55	.....	44.2	2,720
February	57	32	41.3	2,380
March	41	24	31.1	1,910
April	64	23	41.1	2,430
May	729	50	304	18,700
June	617	3	135	8,030
July	88	1	11.1	682
August	163	12	40.5	2,490
September	22	6	10.6	631
The year	729	1	60.8	44,200

BEAVER RIVER AT ROCKYFORD DAM, NEAR MINERSVILLE, UTAH.

LOCATION.—In NW. ¼ sec. 11, T. 30 S., R. 9 W., half a mile below Rockyford dam and 4 miles above Minersville, Beaver County, since June 1, 1916; at former site 1,000 feet below dam December 18, 1913, to May 31, 1916. Between these two sites there is some inflow from springs which has at times amounted to as much as 10 second-feet. This quantity probably varies with stage of water in reservoir.

DRAINAGE AREA.—512 square miles (measured on topographic maps).

RECORDS AVAILABLE.—December 18, 1913, to September 30, 1920.

GAGE.—Friez water-stage recorder at present site since June 1, 1916; inspected by J. L. Jackson.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 1,000 feet below gage.

CHANNEL AND CONTROL.—Bed composed of gravel; some vegetal growth. Concrete control installed November 2–12, 1916. Slight growth of moss on control during summer. One channel at all stages. Banks not subject to overflow. Stage of zero flow, at gage height 0.60 foot according to measurements made October 9, 1917, and September 21, 1920.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 1.72 feet at noon May 13 (discharge, 108 second-feet); minimum stage 0.82 foot at 9.30 a. m. April 5 (discharge, 4 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder 3.12 feet at 7 p. m. June 1 (discharge, 650 second-feet); minimum discharge, [illegible]-feet December 24 to January 16.

[illegible]920: Maximum stage from water-stage recorder, 3.12 feet at 7 p. m. June 1, [illegible]scharge, 650 second-feet); minimum stage recorded, 1.68 feet March 19[illegible] 914 (discharge estimated, 0.3 second-foot).

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ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None between dam and station.

REGULATION.—Flow controlled by operation of gates at Rockyford dam.

ACCURACY.—Stage-discharge relation permanent except for backwater from débris on the control from March 13 to noon, May 13, 1919; not affected by ice. Rating curves well defined. Operation of water-stage recorder satisfactory except November 27–29, 1918, January 2, 3, 10, and December 16–19, 1919, January 21–28, and May 26 to June 1, 1920. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph except for a few days in April and May, 1919, which had considerable fluctuation in stage for which it was obtained by averaging the discharge for intervals of the day. For the days when the water-stage recorder was not in operation, discharge was interpolated, except May 26 to June 1, 1920, for which it was estimated. Records good.

COOPERATION.—Eighteen discharge measurements furnished by Beaver County Irrigation Co.

Discharge measurements of Beaver River at Rockyford dam, near Minersville, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Dec. 14	L. W. Jordan	1.33	42.8	Mar. 13	M. P. Lewis	1.18	30.8
1919.				20	do	1.13	25.9
Jan. 8	do	1.30	39.2	Apr. 3	do	.92	9.1
Mar. 19	Purton and Mess	1.62	79	14	Dickinson and Lewis	.94	8.4
May 13	J. L. Mess [a]	1.70	106	21	W. E. Dickinson	.93	8.9
19	A. B. Purton	1.63	89	May 15	M. P. Lewis	.98	11.8
29	J. L. Mess	1.14	23.0	23	do	1.33	43.6
Aug. 15	A. B. Purton	.86	5.7	29	do	2.72	420
Nov. 1	J. L. Mess	1.02	13.2	June 5	do	2.31	252
24	do	1.25	34.3	19	do	1.47	68
1920.				23	Dickinson and Lewis	1.47	72
Jan. 29	M. P. Lewis [a]	.87	5.8	26	M. P. Lewis	1.53	78
31	do	1.11	20.6	July 31	do	1.27	40.2
				Aug. 14	do	1.29	44.0
				Sept. 11	do	1.29	42.6
				21	A. B. Purton	1.30	46.9

[a] Hydrographer for Beaver County Irrigation Co.

NOTE.—Discharge measurements Mar. 13 to Apr. 3 and May 29 to Sept. 21, 1920, include some see page inflow below control; estimated to vary from 4 to 10 second-feet.

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Daily discharge, in second-feet, of Beaver River at Rockyford dam, near Minersville, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	16	31	52	24	46	47	4	52	22	16	7	10
2	16	33	49	27	44	48	4	52	22	11	7	16
3	18	33	55	30	40	47	4	52	22	8	7	13
4	24	33	56	33	44	46	4	53	21	7	7	11
5	26	37	67	37	42	46	17	54	21	7	7	8
6	22	38	69	38	43	46	28	45	20	7	7	6
7	21	38	94	37	46	48	29	38	21	7	7	6
8	21	42	100	42	47	46	32	39	21	7	8	6
9	22	42	82	39	46	49	33	39	21	6	8	6
10	23	43	66	43	48	46	33	39	21	6	8	6
11	21	44	61	47	49	47	33	39	21	6	7	6
12	20	43	66	44	44	51	33	39	21	6	6	6
13	21	46	55	40	40	56	33	79	21	6	6	6
14	22	49	58	37	42	62	33	106	20	7	6	6
15	23	49	58	36	44	56	44	104	20	7	6	8
16	24	49	58	40	44	53	51	104	21	8	6	11
17	24	47	60	44	44	56	49	102	21	14	7	7
18	23	47	58	51	44	64	48	100	21	10	14	7
19	22	47	56	52	43	78	53	94	21	7	10	7
20	22	44	52	51	44	75	60	58	21	7	7	6
21	26	42	60	48	44	78	60	38	22	7	7	6
22	26	40	52	46	43	78	51	38	22	7	8	6
23	26	39	52	48	47	76	45	37	21	8	8	6
24	26	43	47	49	42	75	46	38	23	7	7	6
25	27	39	34	46	39	75	47	39	23	7	7	6
26	31	37	28	43	44	72	45	38	23	6	6	6
27	31	39	28	42	47	71	44	29	21	6	7	6
28	32	42	42	42	40	65	44	23	19	9	7	6
29	31	44	52	42	.....	62	49	23	18	11	7	6
30	31	46	44	39	.....	60	52	23	18	8	7	6
31	31	.....	39	46	.....	57	.....	22	.....	7	7	.....
1919-20.												
1	7	13	42	5	19	18	8	10	600	54	28	48
2	7	13	43	5	19	20	8	9	590	54	18	48
3	7	14	43	5	19	20	8	9	490	54	39	48
4	7	15	44	5	19	20	8	10	316	52	13	49
5	7	16	46	5	19	20	8	10	254	52	27	44
6	7	16	48	5	19	20	8	10	176	52	46	40
7	8	16	51	5	20	20	8	10	176	54	40	40
8	8	24	49	5	20	21	8	10	176	67	12	40
9	8	26	49	5	20	21	8	10	155	69	18	40
10	8	22	49	5	20	21	8	10	84	70	37	39
11	8	23	49	5	20	21	8	10	64	70	37	39
12	8	24	28	5	20	24	8	10	64	70	38	39
13	8	25	7	5	20	26	8	11	64	69	38	39
14	8	27	7	5	20	25	9	11	64	67	33	39
15	8	29	7	5	19	24	9	11	64	60	40	39
16	8	29	7	5	19	22	9	19	64	55	48	39
17	9	31	7	6	19	20	9	29	64	55	49	39
18	9	32	8	6	20	21	9	29	64	54	49	39
19	10	33	8	6	20	21	9	34	64	54	51	38
20	10	34	8	6	21	21	9	38	55	54	49	39
21	10	34	8	6	19	21	8	39	43	54	49	33
22	10	34	8	6	20	22	8	40	54	54	49	12
23	10	34	6	6	20	22	8	44	61	47	49	12
24	10	34	5	6	20	22	8	46	61	43	49	11
25	10	34	5	6	21	22	8	51	61	43	49	11
26	12	35	5	6	21	22	9		67	43	49	11
27	12	29	5	6	21	22	9		67	40	49	11
28	12	23	5	6	21	21	9	409	55	37	49	11
29	12	34	5	6	19	21	10		55	37	48	11
30	12	39	5	9	.....	21	10		54	37	48	11
31	13	.....	5	19	.....	21	.....		.....	37	48	.....

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Monthly discharge of Beaver River at Rockyford dam, near Minersville, Utah, for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	32	16	24.2	1,490
November	49	31	41.5	2,470
December	100	28	56.5	3,470
January	52	24	41.4	2,550
February	49	39	43.9	2,440
March	78	46	59.2	3,640
April	60	4	36.9	2,200
May	106	22	52.8	3,250
June	23	18	21.0	1,250
July	16	6	7.8	482
August	14	6	7.3	448
September	16	6	7.3	433
The year	106	4	33.3	24,100
1919-20.				
October	13	7	9.1	561
November	39	13	26.4	1,570
December	51	5	21.4	1,320
January	19	5	6.0	369
February	21	19	19.8	1,140
March	26	18	21.4	1,320
April	10	8	8.5	504
May	.....	9	94.2	5,790
June	600	43	141	8,390
July	70	37	53.5	3,290
August	51	12	40.4	2,480
September	49	11	32.0	1,900
The year	600	5	39.4	28,600

INDIAN CREEK AT ADAMSVILLE, UTAH.

LOCATION.—In sec. 30, T. 29 S., R. 8 W., at highway bridge just east of Adamsville, Beaver County, three-quarters of a mile above confluence with Beaver River.

DRAINAGE AREA.—180 square miles (measured on topographic map).

RECORDS AVAILABLE.—June 26 to August 31, 1906; March 16, 1914, to September 30, 1920, when station was discontinued.

GAGE.—Vertical staff nailed to left bridge abutment; read by W. A. Rees.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed composed of rocks, gravel, and sand. One channel at all stages. Banks high and not subject to overflow under ordinary conditions.

EXTREMES OF STAGE.—Not determined.

ICE.—Stream seldom freezes.

DIVERSIONS.—Below all diversions. At certain seasons a small amount of seepage (probably not more than 1 or 2 second-feet) enters between gage and mouth of creek.

REGULATION.—Flow affected by small storage reservoir and irrigation diversions above.

ACCURACY.—Stage-discharge relation for low stages not permanent; not determined for higher stages. Gage read twice weekly, sometimes daily. Discharge not determined as rating curves are not sufficiently defined. Sudden short floods may occur on days on which gage is not read.

Discharge measurements of Indian Creek at Adamsville, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Nov. 9	J. J. Sanford	2.16	0.25	May 19	A. B. Purton	2.40	0.3
Dec. 14	L. W. Jordan	2.02	.10	Aug. 15	do	2.06	.1
1919.				1920.			
Jan. 8	do	1.99	.02	Apr. 21	W. E. Dickinson	2.36	.5
Mar. 19	A. B. Purton	2.38	1.5				

NOTE.—Discharge estimated in each case.

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Daily gage height, in feet, of Indian Creek at Adamsville, Utah, for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1				2.04	2.10	2.22						
2	2.12	2.20					2.54			2.14	2.12	
3								2.30				2.10
4			2.08	2.00					2.40			
5	2.10				2.10	2.20	2.40			2.10		
6		2.18									2.08	5.40
7			2.08					2.48	2.40			
8				1.99	2.20	2.18						
9	2.20	2.16					2.54			2.26	2.08	
10								2.42				2.10
11			2.01	2.00					2.20			
12	2.04				2.20	2.20	2.40			2.24		
13		2.12									2.04	2.00
14			2.02			3.40		2.42	2.20			
15					2.18	2.75					2.06	4.20
16	2.12	2.10					2.44			5.50	2.00	
17						3.02		2.50			4.00	2.28
18			1.90			4.33			2.18		3.40	
19	2.16				2.20	2.38	2.38	2.40		2.18		
20		2.10				2.60					2.00	2.10
21			2.00			3.40		2.80	2.16			
22				2.10	2.12	2.40						
23	2.20	2.10					2.34			2.16	2.00	
24								3.00				2.28
25			1.96	2.10					2.16			
26	2.16					2.30	2.40			2.14		
27		2.19			2.20						2.10	2.20
28			2.00					5.50	2.14			
29				2.10		2.30						
30	2.10	2.10					2.32			2.16	2.10	
31								2.50				
1919–20.												
1	2.18	2.50						4.52			6.00	2.74
2								4.10	3.36		8.00	
3			2.10	2.10		2.32	2.32	3.60		2.30		
4	2.24				2.26			3.50			3.40	2.70
5		2.60						3.48	3.00			
6			2.26			2.30		3.40				
7				2.20	2.40		2.38	3.46			2.60	
8	2.30	2.60						3.40				2.70
9								3.30	2.90			
10			2.18	2.22		2.34	2.40			2.45		
11	2.30				2.34						2.70	2.60
12		2.62						3.30	2.70			
13			2.20			2.32						
14				2.20	2.40		2.44			2.50	2.60	
15	2.32	2.50						3.26				2.66
16									2.70			
17			2.22	2.10		2.30	2.50			2.50		
18	2.30				2.46						2.60	2.70
19		2.30						3.10	2.70			
20			2.22			2.32		3.12				
21				2.70	2.50		2.36	3.20		2.56	2.58	
22	2.34	2.16						3.45				2.86
23								4.50	2.40			
24			2.10	2.60		2.30	2.54	4.70		2.56		
25	2.40				2.36			4.60			2.54	2.64
26		2.12		3.90				4.20	2.34			
27			2.12	3.00		2.30	3.33	4.00				
28				2.80	2.30		3.34	3.80		2.70	2.80	
29	2.50						3.40	3.60				2.64
30				2.60			3.53	3.60	2.30			
31			2.10	2.50		2.36		3.70		3.90		

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COAL CREEK NEAR CEDAR CITY, UTAH.

LOCATION.—In E. ½ sec. 13, T. 36 S., R. 11 W., 500 feet above power plant of Cedar Electric Co. and 1¾ miles southeast of Cedar City, Iron County.

DRAINAGE AREA.—92.5 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 28, 1915, to November 30, 1919, when station was discontinued.

GAGE.—Vertical staff on right bank; read by J. T. Wilkinson and A. G. Matheson.

DISCHARGE MEASUREMENTS.—Made from highway bridge about a mile below or by wading.

CHANNEL AND CONTROL.—Bed composed of coarse gravel and boulders; shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 3.4 feet on May 28 (discharge about 500 second-feet); minimum discharge, 2 second-feet for several days in July and August.

ICE.—Stage-discharge relation not affected by ice during year.

DIVERSIONS.—The only important diversion above the station is power canal which returns the water to the stream about 500 feet below gage. This diversion is fairly constant, 6 to 8 second-feet, and should be added to obtain the total flow above Cedar City.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed April 15. Rating curves fairly well defined between 8 and 100 second-feet. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

Discharge measurements of Coal Creek near Cedar City, Utah, during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Dec. 15	L. W. Jordan	0.60	14.8	Aug. 16	A. B. Purton	[a] 1.72	11.2
1919.				1920.			
Mar. 17	A. B. Purton	.48	11.6	Apr. 15	W. E. Dickinson	[a] 2.72	42.4
May 20	do	1.39	49.3	June 21	do	(a)	71
Aug. 16	do	.80	9.3	Sept. 16	A. B. Purton	(a)	16.4

[a] Measurement made at concrete bridge 1½ miles upstream from station. Temporary gage at this site lost in flood in spring of 1920.

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Daily discharge, in second-feet, of Coal Creek near Cedar City, Utah, for the period Oct. 1, 1918, to Nov. 30, 1919.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	7	9	8	5	6	10	58	178	33	14	6	6	20	6
2	8	9	6	5	6	8	84	178	26	8	5	17	17	6
3	10	9	9	5	10	8	37	200	23	6	5	225	17	6
4	20	9	10	10	10	6	37	178	20	5	5	23	14	6
5	18	12	11	10	6	6	48	157	20	4	5	14	14	4
6	12	10	11	10	6	10	37	138	20	4	5	14	26	4
7	10	10	22	10	6	9	28	95	20	4	4	14	17	2
8	10	10	12	10	6	12	28	80	14	4	4	14	14	2
9	10	10	10	10	6	8	24	73	14	4	4	14	14	2
10	10	10	10	9	8	10	48	73	14	4	3	14	14	3
11	10	10	15	6	6	10	80	67	12	4	3	14	12	3
12	10	10	10	6	6	9	87	67	12	2	2	14	12	3
13	10	9	12	5	12	9	94	67	9	140	2	14	12	3
14	9	9	12	9	12	9	73	61	9	2	2	12	12	3
15	14	9	14	9	6	12	60	56	9	4	2	250	12	4
16	10	10	10	6	8	9	61	56	9	4	9	20	9	12
17	10	14	10	6	9	11	61	50	9	6	6	14	9	12
18	9	14	10	6	8	12	50	50	9	20	8	61	9	12
19	9	9	10	6	6	10	103	50	8	9	6	12	9	12
20	16	9	10	6	6	10	138	50	9	12	5	9	9	12
21	12	12	10	6	9	10	138	50	8	8	5	8	9	12
22	10	10	9	6	14	10	190	56	8	8	5	6	8	12
23	10	10	9	6	9	11	200	50	6	9	2	6	8	12
24	10	10	4	6	8	10	210	56	6	9	5	5	8	14
25	10	8	8	6	16	12	87	56	6	8	5	4	8	14
26	9	6	8	6	10	18	73	46	6	8	9	3	8	17
27	13	8	8	6	10	27	61	46	6	6	6	3	8	17
28	14	10	10	9	10	20	61	500	5	9	5	61	8	17
29	9	9	9	8	.....	24	103	61	5	8	4	50	8	20
30	9	10	9	6	.....	54	178	41	5	6	100	33	8	20
31	9	.....	6	6	.....	37	.....	33	.....	6	6	.....	6	.....

Monthly discharge of Coal Creek near Cedar City, Utah, for the period Oct. 1, 1918, to Nov. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	20	7	10.9	670
November	14	6	9.8	583
December	22	4	10.1	621
January	10	5	7.1	437
February	16	6	8.4	466
March	54	6	13.6	836
April	210	24	84.6	5,030
May	500	33	94.2	5,790
June	33	5	12.0	714
July	140	2	11.1	682
August	100	2	7.8	482
September	250	3	31.8	1,890
The year	500	2	25.1	18,200
1919.				
October	26		11.6	713
November	20		9.1	541

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OWENS LAKE BASIN.

OWENS RIVER NEAR ROUND VALLEY, CALIF.

LOCATION.—In SE. ¼ sec. 10, T. 6 S., R. 31 E., below Sheep Bridge, 700 feet above mouth of Rock Creek and 2 miles north of Round Valley, Inyo County.

DRAINAGE AREA.—About 450 square miles.

RECORDS AVAILABLE.—August 4, 1903, to September 30, 1920.

GAGE.—Vertical staff on left bank 85 feet below bridge; read by W. G. Allen. Original gage 100 feet above the present one at an independent datum, prior to May 29, 1907.

DISCHARGE MEASUREMENTS.—Made from cable at gage.

CHANNEL AND CONTROL.—Rock and boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 3.05 feet from 2.10 to 3.20 p. m. May 30 (discharge, 595 second-feet); minimum stage, 1.55 feet February 27 (discharge, 100 second-feet).

Maximum stage recorded during the year ending September 30, 1920, 2.60 feet June 23 (discharge, 366 second-feet); minimum stage 1.70 feet January 7 (discharge, 110 second-feet).

1903–1920: Maximum stage recorded, 4.0 feet June 30, 1907 (discharge, 1,190 second-feet); minimum stage 1.55 feet February 27, 1919 (discharge, 100 second-feet).

ICE.—Shore ice exists at times, but ordinarily does not affect the stage-discharge relation.

DIVERSIONS.—No water is diverted above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curve fairly well defined. Gage read to hundredths every other day. Daily discharge ascertained by shifting-control method for days when gage was read, and interpolating discharge for days between. Records good.

COOPERATION.—Gage-height record and discharge measurements furnished by the city of Los Angeles.

Discharge measurements of Owens River near Round Valley, Calif., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 17	J. E. Jones	1.92	177	Jan. 1	Arledge and Allen	1.78	123
Feb. 27	do	1.55	100	Feb. 9	do	1.94	176
Mar. 14	do	1.98	188	Mar. 3	do	2.06	202
May 30	do	3.05	596	Apr. 8	do	1.94	170
June 26	do	2.19	228	June 15	Arledge and McLaren	2.18	325
July 22	do	1.95	195	Aug. 15	A. R. Arledge	1.79	139
Aug. 28	do	1.83	149	27	J. E. Jones	1.95	185
				Sept. 24	do	1.74	130

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Daily discharge, in second-feet, of Owens River near Round Valley, Calif., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	388	196	209	176	172	179	381	254	469	202	162	141
2	409	194	206	172	176	181	413	259	432	197	139	141
3	382	194	204	170	181	183	476	276	394	198	177	142
4	356	194	204	168	182	182	539	294	408	199	164	143
5	330	194	204	171	183	181	394	300	421	200	150	141
6	304	194	202	174	194	183	248	307	411	200	137	139
7	294	.....	200	177	206	186	238	316	402	201	144	142
8	283	.....	199	174	204	188	229	324	393	202	150	146
9	273	.....	196	172	202	180	240	324	384	210	156	146
10	262	.....	193	172	208	172	250	324	354	219	162	145
11	254	.....	190	172	214	178	250	324	324	209	168	144
12	245	.....	192	172	185	185	250	324	306	199	166	143
13	245	.....	194	172	194	186	234	328	300	205	164	144
14	245	.....	192	168	204	188	219	332	283	211	162	145
15	245	.....	190	164	185	188	222	348	278	212	160	146
16	248	.....	188	172	186	192	224	363	273	214	164	146
17	250	.....	185	181	188	188	226	360	255	206	168	146
18	234	.....	183	190	197	191	224	356	237	197	170	145
19	219	.....	182	192	206	193	221	360	288	198	172	145
20	217	.....	181	194	192	195	224	363	338	199	169	145
21	214	.....	179	192	179	197	226	380	298	196	166	145
22	212	.....	181	190	172	196	226	398	259	194	161	145
23	209	.....	172	191	164	194	226	440	254	188	156	146
24	204	.....	168	192	177	194	228	481	250	183	150	146
25	199	.....	181	190	168	204	229	481	240	170	145	142
26	202	.....	194	188	160	214	240	481	229	158	146	137
27	204	.....	194	179	100	226	250	512	228	170	148	140
28	202	.....	192	170	185	239	249	544	226	181	150	142
29	199	.....	188	174	.....	267	248	570	216	180	145	145
30	199	.....	184	177	.....	308	248	595	206	179	143	145
31	199	.....	180	174	.....	349	.....	532	.....	166	141	.....
1919–20.												
1	140	155	153	123	191	181	198	115	304	252	176	171
2	140	162	162	126	195	188	194	117	318	230	181	153
3	139	169	172	130	199	196	185	120	332	207	186	190
4	138	152	174	134	202	196	176	123	332	216	178	228
5	158	136	176	138	204	196	174	126	332	225	169	196
6	179	134	172	124	196	207	172	130	335	234	184	164
7	158	132	167	110	189	207	167	145	338	237	199	17
8	136	140	162	120	176	207	162	160	338	240	176	189
9	155	148	156	130	164	207	160	160	338	229	153	180
10	174	156	151	130	164	220	158	160	335	218	158	172
11	175	164	142	130	164	232	165	168	332	207	162	165
12	176	172	132	144	164	250	172	176	321	196	162	158
13	177	164	130	158	164	267	158	189	310	202	162	158
14	178	155	127	172	164	285	144	202	324	209	151	158
15	178	146	126	160	172	236	148	186	338	198	140	149
16	179	138	125	147	179	186	153	169	321	186	148	140
17	180	140	123	150	182	173	146	175	304	172	155	148
18	181	142	121	153	184	160	140	181	300	158	150	155
19	162	144	155	156	177	182	149	226	297	149	144	142
20	144	146	147	159	171	204	158	270	322	140	146	130
21	160	147	146	161	164	188	142	270	346	140	147	145
22	176	149	144	164	162	171	125	270	356	140	152	160
23	157	151	144	163	160	155	122	270	366	138	156	146
24	138	153	144	169	158	180	119	270	349	136	188	122
25	151	155	144	172	160	204	116	255	332	128	218	146
26	164	159	144	177	162	188	113	240	314	119	207	160
27	156	164	146	181	167	172	113	252	297	134	196	162
28	147	168	149	186	172	215	113	264	285	149	192	164
29	132	172	140	184	176	258	113	282	273	162	189	164
30	117	162	132	181	.....	230	113	300	262	176	189	164
31	136	.....	128	186	.....	202	.....	302	.....	176	189	.....

NOTE.—No gage-height record Nov. 7–30, 1918, discharge estimated 200 second-feet.

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Monthly discharge of Owens River near Round Valley, Calif., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	409	199	256	15,700
November	.....	.....	206	12,300
December	209	168	191	11,700
January	194	164	178	10,900
February	214	100	184	10,200
March	349	172	203	12,500
April	539	219	269	16,000
May	595	254	382	23,500
June	469	206	312	18,600
July	219	158	196	12,000
August	177	137	156	9,590
September	146	137	144	8,570
The year	595	100	223	162,000
1919-20.				
October	181	117	157	9,650
November	172	132	152	9,040
December	176	121	146	8,980
January	186	110	152	9,350
February	204	158	175	10,100
March	285	155	205	12,600
April	198	113	149	8,870
May	302	115	202	12,400
June	366	262	313	18,600
July	252	119	184	11,300
August	218	140	171	10,500
September	226	130	162	9,640
The year	95	110	181	131,000

OWENS RIVER NEAR BIG PINE, CALIF.

LOCATION.—In sec. 2, T. 11 S., R. 34 E., at Charlies Butte, 11 miles southeast of Big Pine, Inyo County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 20, 1906, to September 30, 1920.

GAGE.—Vertical staff on left bank; read by J. I. Jones.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Sand and gravel; shift slightly. Right bank high; left bank subject to overflow during floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 4.80 feet May 31 (discharge, 980 second-feet); minimum stage 0.50 foot September 22–26 (discharge, 61 second-feet).

Maximum stage recorded during the year ending September 30, 1920, 3.35 feet December 12 (discharge, 524 second-feet); minimum stage 0.45 foot August 10–14 (discharge, 57 second-feet).

1906–1920: Maximum stage recorded, 11.2 feet about 9 p. m. January 26, 1914 (discharge, from extension of rating curve, about 3,220 second-feet); minimum stage −0.05 foot June 13–16, 1908 (discharge, 36 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—On account of diversions above the station, the record does not indicate the total run-off from the drainage area.

REGULATION.—Flow is partly regulated by diversions.

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ACCURACY.—Stage-discharge relation not permanent. Several fairly well defined rating curves used during the period. Gage read to hundredths once a day. Daily discharge ascertained by applying gage height to rating table. Records good.

COOPERATION.—Gage-height record and discharge measurements furnished by the city of Los Angeles.

Discharge measurements of Owens River at Big Pine, Calif., during the years ending Sept. 30, 1919 and 1920.

[Made by J. E. Jones.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1918.	*Feet.*	*Sec.-ft.*	1919.	*Feet.*	*Sec.-ft.*	1920.	*Feet.*	*Sec.-ft.*
Oct. 3	3.96	779	June 21	1.05	97	Apr. 6	2.15	266
1919.			July 21	.80	83	June 11	2.15	262
Jan. 14	2.90	455	Aug. 9	.60	66	July 20	.61	68
Feb. 22	2.80	420	Dec. 16	2.78	404	Aug. 2	.55	61
May 27	3.25	571	1920.			19	.51	64
June 14	2.10	255	Mar. 8	2.60	379	Sept. 6	.55	70
						29	.52	60

Daily discharge, in second-feet, of Owens River near Big Pine, Calif., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	365	424	424	384	465	424	465	92	895	94	73	69
2	465	424	465	404	486	444	465	92	839	90	73	69
3	730	424	465	404	465	424	507	99	729	85	73	69
4	705	424	465	424	465	424	507	99	648	85	73	69
5	630	424	465	444	465	444	551	99	623	85	73	69
6	529	424	465	465	465	424	705	99	548	85	73	69
7	507	424	507	424	465	424	418	92	524	85	73	61
8	486	465	529	444	465	424	333	92	476	85	69	61
9	486	465	529	444	486	404	333	92	452	85	69	61
10	465	465	529	444	486	404	256	99	388	85	69	61
11	465	465	486	465	529	404	256	99	368	85	69	61
12	465	444	444	465	551	384	211	99	329	85	69	61
13	424	465	444	444	507	384	247	106	310	90	69	61
14	444	465	424	444	507	384	238	106	255	85	69	61
15	424	465	465	444	507	384	202	106	204	85	69	69
16	465	486	465	444	465	384	194	106	188	85	69	61
17	465	486	465	465	465	384	185	106	173	85	69	61
18	444	424	465	465	465	384	169	112	159	94	69	61
19	424	444	424	465	424	365	169	118	140	90	69	61
20	424	465	424	486	424	384	125	125	134	85	65	61
21	424	465	424	486	404	424	125	177	128	90	65	61
22	424	444	424	465	424	424	112	220	118	85	65	61
23	424	444	424	465	424	424	112	333	113	85	65	61
24	424	465	384	465	424	404	112	440	108	85	65	61
25	424	444	384	486	404	384	99	509	103	81	69	61
26	404	444	384	465	424	384	99	533	98	81	69	61
27	404	424	384	444	444	384	106	557	94	81	65	61
28	424	424	384	465	424	384	99	630	103	85	65	61
29	424	424	424	444	.....	404	99	705	103	77	65	61
30	424	424	404	465	.....	424	99	890	108	77	65	61
31	424	.....	404	465	.....	444	.....	980	.....	77	65	.....

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Daily discharge, in second-feet, of Owens River near Big Pine, Calif., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	65	291	368	348	388	310	368	90	134	204	69	73
2	65	310	408	388	388	388	348	81	159	188	65	73
3	69	310	388	388	398	476	310	77	173	173	65	69
4	69	310	368	388	408	388	291	77	173	173	65	69
5	77	329	388	388	388	368	273	73	173	173	65	69
6	90	310	388	388	388	368	273	73	173	173	65	65
7	94	310	388	348	388	348	273	73	188	159	61	65
8	98	310	368	329	388	348	237	73	204	146	61	65
9	103	310	368	348	368	368	204	69	273	128	61	65
10	123	310	348	348	368	388	159	65	237	123	57	65
11	159	329	388	348	388	388	146	61	273	118	57	65
12	173	348	524	368	368	388	140	61	237	108	57	65
13	173	348	476	388	348	388	140	77	220	98	57	65
14	173	329	388	388	348	388	123	69	204	94	57	61
15	173	329	388	388	348	476	118	69	220	90	61	61
16	173	310	388	388	348	348	103	69	204	77	61	60
17	188	329	388	388	348	310	108	73	220	77	65	60
18	188	329	388	388	329	310	103	73	220	73	61	59
19	188	329	388	388	310	291	113	78	204	73	61	60
20	188	348	388	388	310	255	85	77	204	69	61	59
21	204	348	408	388	310	291	85	81	237	69	61	59
22	237	348	408	388	291	310	73	85	310	69	61	61
23	255	329	388	388	388	348	65	103	291	73	61	61
24	273	329	388	388	368	348	65	103	273	77	61	61
25	273	348	388	388	329	348	61	103	255	77	77	65
26	273	329	368	388	310	368	61	98	220	77	77	65
27	273	329	388	388	291	388	61	81	204	69	94	65
28	291	310	388	388	300	368	65	77	188	69	90	65
29	291	291	388	388	310	388	65	73	204	69	85	61
30	310	310	388	388	.....	388	61	81	220	69	77	61
31	310	.....	368	388	.....	388	.....	103	.....	69	73	.....

Monthly discharge of Owens River near Big Pine, Calif., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	730	365	466	28,700
November	486	424	446	26,500
December	529	384	444	27,300
January	486	384	451	27,700
February	551	404	462	25,700
March	444	365	405	24,900
April	705	99	253	15,100
May	980	92	258	15,900
June	895	94	315	18,700
July	94	77	85.1	5,230
August	73	65	68.6	4,220
September	69	61	62.9	3,740
The year	980	61	309	224,000
1919-20.				
October	310	65	181	11,100
November	348	291	323	19,200
December	524	348	392	24,100
January	388	329	379	23,300
February	408	291	352	20,200
March	476	255	362	22,300
April	368	61	153	9,100
May	103	61	78.7	4,840
June	310	134	216	12,900
July	204	69	107	6,580
August	94	57	66.1	4,060
September	73	59	63.9	3,800
The year	524	57	222	161,000

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OWENS LAKE NEAR LONE PINE, CALIF.

LOCATION.—On west shore of Owens Lake 1 mile north of Brier Siding on California & Nevada Railroad (Southern Pacific Co.), and 9 miles south of Lone Pine, Inyo County.

RECORDS AVAILABLE.—March, 1908, to September 30, 1920.

GAGE.—Vertical staff, installed November 1, 1911, at a boulder point east of railroad culvert No. 507B; read occasionally by an employee of the city of Los Angeles. Original gage, a vertical staff near the old Smith ranch, was submerged in July, 1911, and an upper section was installed. Gage datum before July 29, 1913, 3,564.90 feet above sea level, U. S. G. S. datum; after that date, 3,561.90 feet. January 12, 1915, gage was washed out but was replaced at same location and datum.

EXTREMES OF STAGE.—1911–1920: Maximum elevation above mean sea level recorded, 3,578.75 feet March 16 and April 7, 1912; minimum elevation 3,564.7 feet September 30, 1920.

COOPERATION.—Records furnished by city of Los Angeles.

Elevations given in table are computed from original reading made on gage, the datum of which is stated in paragraph headed "gage." To reduce these elevations to mean sea level (U. S. G. S. datum) add 3,550 feet.

Daily elevation, in feet, of Owens Lake near Lone Pine, Calif., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1											20.50	
2					22.70			22.35	21.90	21.20		19.85
3			22.55			22.70	22.70					
4		22.75										
5								22.35		21.10	20.40	
6									21.85			19.70
7		22.70		22.55	22.75							
8							22.65				20.30	
9								22.28	21.80			
10						22.70				21.05		
11		22.70		22.55	22.75		22.60					
12												
13								22.25	21.70		20.20	
14				22.60	22.75	22.70	22.60					
15		22.70	22.65							21.00		
16								22.20				
17	22.90			22.60		22.65	22.55		21.60			
18		22.70	22.60									
19								22.10				
20					22.70				21.45			
21	22.85			22.60		22.70				20.80		
22		22.70					22.50	22.05				
23			22.60									
24				22.65	22.70	22.70						
25	22.85						22.45			20.70		
26		22.70	22.60					22.00			19.95	
27					22.70				21.35			
28	22.80						22.40					
29				22.70		22.70				20.60		
30		22.60	22.65					21.95			19.90	
31	22.80											

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Daily elevation, in feet, of Owens Lake near Lone Pine, Calif., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	19.0											
2								17.65				
3		18.65		18.35		18.25	18.05				15.8	15.2
4	19.0								17.1			
5										16.5		
6					18.35			17.6				
7		18.6				18.25	18.0				15.75	15.1
8	18.9			18.3					17.0			
9			18.35		18.35							
10						18.2	17.9	17.55		16.35		
11		18.5							16.95			
12			18.35	18.2							15.65	
13	18.85											15.05
14					18.4			17.45	16.8			
15						18.2	17.85					
16	18.8	18.45		18.25							15.55	
17					18.35				16.8	16.2		
18			18.35									
19		18.4				18.2		17.45				14.85
20	18.75			18.25	18.4		17.75				15.45	
21												
22		18.35						17.4	16.75			
23	18.8					18.2	17.8			16.0	15.4	14.8
24				18.25	18.3							
25												
26	18.75	18.35	18.35			18.15			16.7			
27							17.7	17.3		15.9	15.3	
28												
29												
30			18.35			18.15					15.25	14.7
31								17.2				

ROCK CREEK NEAR ROUND VALLEY, CALIF.

LOCATION.—In NE. ¼ SE. ¼ sec. 9, T. 6 N., R. 31 E., below highway bridge, a short distance above mouth of Pine Creek, and 2 miles northwest of Round Valley, Inyo County.

DRAINAGE AREA.—About 46 square miles.

RECORDS AVAILABLE.—August 3, 1903, to September 30, 1920.

GAGE.—Vertical staff on left bank about 600 feet below bridge; read by W. G. Allen. Prior to July, 1906, gage was at highway bridge.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage or by wading.

CHANNEL AND CONTROL.—Sand and cobblestones; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 2.90 feet at 1.35 p. m. May 30 (discharge, 159 second-feet); minimum stage, 0.92 foot at 5.40 p. m. April 25 (discharge, 23 second-feet).

Maximum stage recorded during year ending September 30, 1920, 1.90 feet May 30 (discharge, 84 second-feet); minimum stage 0.90 foot April 16 (discharge, 19 second-feet).

1903–1920: Maximum stage recorded, 5.0 feet January 25, 1914 (discharge, 360 second-feet); minimum discharge, April 20-23, 1905, 14 second-feet.

ICE.—Shore ice forms, but probably does not affect stage-discharge relation.

DIVERSIONS.—Water for irrigation is diverted above the station.

REGULATION.—Flow partly regulated by diversions.

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ACCURACY.—Stage-discharge relation not permanent. Rating curve fairly well defined. Gage read to hundredths every other day. Daily discharge ascertained by shifting-control method and interpolating discharge for days when gage was not read. Records fair.

COOPERATION.—Gage-height record and discharge measurements furnished by the city of Los Angeles.

Discharge measurements of Rock Creek near Round Valley, Calif., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 17	J. E. Jones	1.15	29	Feb. 8	A. R. Arledge	0.95	25
Feb. 27	do	1.20	31	9	Arledge and Allen	1.14	39
Mar. 14	do	1.10	27	12	A. R. Arledge	.98	25
May 30	do	2.86	156	Apr. 8	Arledge and Allen	1.00	23
June 26	do	1.38	45	May 24	A. R. Arledge	1.50	69
July 22	do	1.30	42	June 9	do	2.10	73
Aug. 28	do	1.00	30	24	Arledge and Silvius	1.56	52
1920.				Aug. 15	A. R. Arledge	.97	28
Jan. 1	A. R. Arledge	1.04	28	28	J. E. Jones	1.06	29
19	do	1.05	28	Sept. 24	do	.90	22

Daily discharge, in second-feet, of Rock Creek near Round Valley, Calif., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	115	31	32	30	28	27	29	31	110	38	27	30
2	103	29	33	30	29	28	28	34	114	30	27	29
3	87	28	34	30	30	29	28	38	119	30	26	30
4	71	28	33	30	30	30	28	42	98	30	26	30
5	64	28	32	30	31	30	26	44	76	30	26	28
6	56	28	31	30	30	29	24	47	77	30	26	27
7	54	.....	30	30	29	28	24	50	78	30	27	26
8	51	.....	30	30	28	27	23	54	78	30	28	25
9	49	.....	31	30	27	28	24	51	79	32	29	25
10	47	.....	33	30	59	28	25	48	76	34	29	25
11	44	.....	34	30	53	29	24	48	72	35	30	26
12	40	.....	33	30	31	30	24	49	76	36	30	25
13	41	.....	32	30	30	30	26	52	60	38	29	26
14	42	.....	32	30	29	30	26	55	52	40	28	26
15	43	.....	32	30	26	24	25	58	44	41	28	26
16	40	.....	28	29	28	27	26	62	36	42	28	25
17	38	.....	24	28	30	30	24	62	38	45	29	26
18	38	.....	28	30	30	32	25	61	40	48	33	25
19	37	.....	32	29	29	33	26	61	38	44	37	25
20	37	.....	36	28	27	35	26	61	36	39	34	25
21	37	.....	30	28	25	36	25	72	42	40	32	25
22	37	.....	30	28	24	33	26	83	47	42	31	25
23	37	.....	28	28	24	30	28	86	47	38	30	25
24	36	.....	27	28	25	30	26	88	47	33	29	25
25	36	.....	26	28	27	30	28	96	46	34	28	27
26	36	.....	25	27	29	29	24	103	45	34	29	29
27	36	.....	34	26	31	29	25	122	46	32	30	29
28	35	.....	30	26	31	29	26	141	46	30	30	30
29	34	.....	30	26	.....	30	27	150	46	29	30	30
30	33	.....	30	27	.....	30	28	159	45	28	30	30
31	32	.....	30	28	.....	30	.....	134	.....	28	30	.....

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Daily discharge, in second-feet, of Rock Creek near Round Valley, Calif., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	30	32	33	28	36	29	24	24	78	42	27	24
2	29	33	33	33	34	27	25	23	75	46	27	25
3	30	34	33	32	33	23	24	23	72	50	27	24
4	30	34	32	32	31	24	23	23	70	48	31	23
5	30	34	32	31	29	25	23	22	67	46	35	24
6	30	34	32	30	28	25	23	22	66	44	31	26
7	30	33	32	30	27	26	23	22	64	41	27	26
8	30	33	33	29	25	25	23	23	72	38	28	25
9	30	33	35	28	37	24	22	24	80	41	28	24
10	30	33	36	24	31	24	20	25	70	44	26	24
11	30	33	34	32	25	23	22	24	60	44	23	24
12	30	33	32	31	25	23	23	23	58	45	24	23
13	29	33	32	31	25	24	24	26	57	38	25	23
14	29	33	32	30	25	24	25	28	56	30	26	23
15	29	33	34	29	25	23	22	26	56	30	28	24
16	28	33	36	27	25	22	19	25	56	30	26	24
17	28	33	36	28	24	24	21	30	55	30	24	24
18	28	33	34	28	24	23	23	36	56	30	24	23
19	29	33	34	28	24	24	23	47	56	28	24	24
20	30	33	36	28	25	24	23	58	70	25	25	26
21	30	32	34	28	25	24	22	71	75	25	26	24
22	29	32	34	28	25	23	21	84	66	25	25	23
23	29	32	33	28	25	23	20	77	57	28	24	24
24	29	32	33	28	25	22	20	70	52	30	25	24
25	29	32	31	30	25	22	22	61	55	28	26	24
26	29	33	31	28	25	25	23	52	50	27	28	23
27	30	35	32	29	25	28	23	58	46	28	30	23
28	30	37	32	30	25	26	23	65	50	28	30	23
29	32	38	32	38	27	25	24	74	54	28	26	24
30	34	36	31	46	.....	24	24	84	48	27	24	25
31	33	.....	30	41	.....	24	.....	81	.....	27	23	.....

NOTE.—No record Nov. 7-30, 1918; discharge estimated 30 second-feet.

Monthly discharge of Rock Creek near Round Valley, Calif., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	115	32	47.9	2,950
November	.....	.....	30.7	1,830
December	36	24	30.6	1,880
January	30	26	28.8	1,770
February	59	24	30.4	1,690
March	36	24	29.7	1,830
April	29	23	25.6	1,520
May	159	31	72.3	4,450
June	119	36	61.8	3,680
July	48	28	35.2	2,160
August	37	26	29.2	1,800
September	30	25	26.7	1,590
The year	159	.....	37.5	27,200
1919-20.				
October	34	28	29.8	1,830
November	38	32	33.4	1,990
December	36	30	33.0	2,030
January	46	24	30.4	1,870
February	37	24	27.1	1,560
March	29	22	24.3	1,490
April	25	19	22.6	1,340
May	84	22	42.9	2,640
June	80	46	61.6	3,670
July	50	25	34.5	2,120
August	35	23	26.5	1,630
September	26	23	24.0	1,430
The year	84	19	32.5	23,600

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PINE CREEK NEAR ROUND VALLEY, CALIF.

LOCATION.—In NE. ¼ SE. ¼ sec. 9, T. 6 S., R. 31 E., 300 feet above highway bridge, 600 feet above junction with Rock Creek, and 2 miles northwest of Round Valley, Inyo County.

DRAINAGE AREA.—About 32 square miles above mouth of canyon.

RECORDS AVAILABLE.—August 3, 1903, to September 30, 1920.

GAGE.—Vertical staff on left bank 300 feet above bridge; read by W. G. Allen. Prior to May 13, 1908, gage was 150 feet below highway bridge.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage or by wading.

CHANNEL AND CONTROL.—Lava rock and sand; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 6 feet at 7.15 p. m. May 28 (discharge, 211 second-feet); minimum stage 3.08 feet September 2, 4, 8, 22, 24, and 26 (discharge, 0.2 second-feet).

Maximum stage recorded during year ending September 30, 1920, 5.02 feet June 9 (discharge, 110 second-feet); minimum stage 3.11 feet August 13 (discharge, 0.1 second-foot).

1903–1920: Maximum discharge, 370 second-feet June 22, 1911; minimum discharge, 0.1 second-foot August 13, 1920.

ICE.—Ice occasionally forms at station but does not affect stage-discharge relation.

DIVERSIONS.—Water is diverted above station for irrigation.

REGULATION.—Diversions probably affect the flow.

ACCURACY.—Stage-discharge relation not permanent. Gage read to hundredths every other day. Daily discharge ascertained by shifting-control method and interpolating discharge for days when gage was not read. Records fair.

COOPERATION.—Gage-height record and discharge measurements furnished by the city of Los Angeles.

Discharge measurements of Pine Creek near Round Valley, Calif., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 17	J. E. Jones	3.52	4.5	Feb. 8	A. R. Arledge	3.36	3.0
Feb. 27	do	3.55	4.5	9	Arledge and Allen	3.50	6.4
Mar. 14	do	3.52	5.1	12	A. R. Arledge	3.40	3.9
May 30	do	5.40	145	Mar. 6	Arledge and Allen	3.32	2.6
June 26	do	3.88	16	Apr. 8	do	3.29	2.0
July 22	do	3.50	5.6	May 10	do	3.08	.2
Aug. 28	do	3.23	1.1	June 9	A. R. Arledge	4.91	90
				24	Arledge and Silvius	4.32	45
1920.				Aug. 15	A. R. Arledge	3.28	.9
Jan. 1	A. R. Arledge	3.37	2.1	28	J. E. Jones	3.25	2.4
19	do	3.43	2.7	Sept. 24	do	3.15	1.0

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Daily discharge, in second-feet, of Pine Creek near Round Valley, Calif., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	48	7.0	3.8	4.2	4.0	3.5	3.1	0.2	84	4.2	1.0	0.2
2	71	5.5	4.0	4.0	4.0	3.6	3.3	.2	79	2.0	1.2	.2
3	52	4.2	4.2	4.0	4.0	3.8	2.9	.2	74	2.0	.9	.2
4	33	4.8	4.2	4.0	3.9	3.6	2.5	.3	70	1.9	.9	.2
5	27	5.5	4.2	4.0	3.8	3.5	2.3	.3	65	1.8	.9	.3
6	21	6.0	4.4	4.0	3.4	3.3	2.1	.3	64	1.8	.9	.4
7	20	.....	4.6	4.0	3.1	3.1	2.0	.4	61	1.8	.8	.3
8	19	.....	4.8	4.0	3.2	2.9	1.9	.4	59	1.7	.6	.2
9	18	.....	4.5	4.0	3.3	3.1	1.9	1.4	58	1.4	.7	.2
10	17	.....	4.3	4.0	18	3.3	1.9	2.3	53	1.1	.8	.3
11	14	.....	4.0	4.0	16	3.8	1.2	1.9	48	1.6	.9	.3
12	12	.....	4.4	4.0	4.0	4.2	.4	1.5	44	2.0	1.8	.3
13	13	.....	4.8	4.0	3.8	4.5	.6	6.0	40	3.0	2.7	.3
14	13	.....	4.9	3.8	3.5	4.8	.7	11	30	3.9	2.3	.3
15	14	.....	5.0	3.5	3.5	4.8	.7	20	19	3.8	1.9	.6
16	14	.....	4.5	4.0	3.4	4.8	.7	28	8.5	3.6	1.8	.9
17	14	.....	4.0	4.5	3.3	4.2	.6	28	11	4.2	1.6	.7
18	14	.....	3.9	4.2	3.3	4.6	.6	27	13	4.8	1.7	.5
19	13	.....	3.9	4.1	3.3	5.0	.5	26	15	3.0	1.8	.4
20	13	.....	3.8	4.0	2.9	5.5	.4	26	17	1.1	1.6	.3
21	13	.....	3.3	4.0	2.5	6.0	.2	55	16	3.4	1.4	.2
22	13	.....	3.3	4.0	2.5	5.0	.2	84	14	5.7	1.2	.2
23	13	.....	3.5	3.9	2.5	4.0	.2	88	18	3.4	.9	.2
24	12	.....	2.9	3.8	3.1	4.0	.2	92	23	1.1	.8	.2
25	11	.....	3.2	3.9	3.0	3.8	.2	97	20	1.2	.6	.2
26	11	.....	3.5	4.0	2.9	3.5	.2	102	16	1.3	.8	.2
27	11	.....	4.5	3.6	4.5	3.5	.2	148	14	1.6	.9	.2
28	10	.....	4.8	3.3	2.9	3.5	.2	194	11	1.9	1.1	.3
29	9.5	.....	4.6	3.3	.....	3.3	.2	174	9.0	1.2	.6	.3
30	9.0	.....	4.5	3.3	.....	2.1	.2	154	6.5	.6	.4	.3
31	8.5	.....	4.3	3.6	.....	2.9	.....	119	.....	.8	.3	.....
1919-20.												
1	.3	1.9	2.6	1.8	2.8	3.9	2.2	5.5	57	24	.7	2.3
2	.8	1.8	2.6	3.4	2.8	4.1	2.3	9.5	58	26	.6	3.1
3	.4	1.7	2.6	1.6	2.9	3.1	2.2	5.0	58	27	.4	3.2
4	.4	1.7	2.6	2.1	2.8	3.0	2.2	.4	58	30	1.4	3.2
5	.6	1.7	2.6	2.6	2.6	2.9	2.2	.4	59	33	2.4	2.3
6	.7	1.7	2.6	2.4	3.1	2.9	2.2	.3	60	36	2.4	1.4
7	.8	1.7	2.6	2.2	3.6	2.6	2.1	.3	61	32	2.4	1.4
8	.8	1.8	2.2	2.3	2.9	2.5	2.0	.3	86	28	1.6	1.4
9	.8	1.9	1.8	2.4	5.0	2.4	2.0	.3	110	23	.8	1.2
10	.9	2.0	1.4	1.2	6.0	2.4	2.0	.3	88	38	.6	1.0
11	1.0	2.1	1.6	1.8	3.1	2.4	2.0	.3	65	32	.3	.9
12	1.0	2.1	1.9	1.8	3.9	2.4	1.9	.3	57	27	.2	.8
13	1.1	2.0	1.6	1.9	3.3	2.3	1.9	.3	49	20	.1	1.2
14	1.1	1.8	1.4	1.9	2.7	2.3	1.9	.3	53	13	.6	1.5
15	1.2	1.7	1.5	1.6	3.0	2.3	2.0	.3	57	10	1.0	1.6
16	1.2	1.6	1.6	1.4	3.4	2.3	2.0	.3	54	6.0	.6	1.6
17	1.3	1.6	1.5	1.6	3.5	2.3	2.4	2.6	50	4.8	.3	1.5
18	1.4	1.6	1.4	1.9	3.6	3.1	2.9	5.0	49	3.7	.4	1.4
19	1.6	1.6	1.4	2.7	3.3	2.8	3.0	6.0	49	2.2	.6	1.4
20	1.7	1.5	1.3	2.5	3.0	2.6	3.1	7.5	66	.8	.9	1.4
21	1.8	1.5	2.0	2.3	2.7	2.7	2.4	11	84	.7	1.2	1.4
22	1.8	1.5	1.9	2.0	3.0	2.8	1.6	14	72	.6	.9	1.3
23	1.8	1.4	1.8	1.6	3.4	2.9	1.2	9.0	60	.8	.6	1.2
24	1.8	1.4	1.6	2.0	3.7	2.8	.9	3.9	46	.9	1.0	1.2
25	1.8	1.4	1.5	1.8	3.7	2.8	1.0	2.2	54	.8	1.4	1.2
26	1.8	1.7	1.4	2.2	3.7	3.9	1.0	.5	42	.8	1.5	1.2
27	1.8	2.0	2.0	2.4	3.6	5.0	1.1	10	30	1.6	1.6	1.0
28	1.8	2.3	2.6	2.6	3.4	4.1	1.2	20	29	2.3	2.6	.9
29	1.8	2.6	2.3	2.4	3.6	3.2	1.2	37	28	1.2	4.6	1.2
30	1.8	2.6	2.0	2.3	.....	2.7	1.1	54	26	.1	3.0	1.5
31	1.8	.....	1.9	2.6	.....	2.2	.....	56	.....	.4	1.5	.....

NOTE.—No record Nov. 7-30, 1918; discharge estimated 5 second-feet.

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Monthly discharge of Pine Creek near Round Valley, Calif., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	71	8.5	18.7	1,150
November	7	.....	5.10	303
December	5	2.9	4.15	255
January	4.5	3.3	3.90	240
February	18	2.5	4.34	241
March	6	2.9	3.95	243
April	3.3	.2	1.08	64.3
May	194	.2	48.0	2,950
June	84	6.5	35.3	2,100
July	5.7	.6	2.35	144
August	2.7	.3	1.15	70.7
September	.9	.2	.31	18.6
The year	194	.2	10.8	7,780
1919-20.				
October	1.8	.3	1.24	76.2
November	2.6	1.4	1.80	107
December	2.6	1.3	1.93	119
January	3.4	1.2	2.11	130
February	6.0	2.6	3.38	194
March	5.0	2.2	2.89	178
April	3.1	.9	1.91	114
May	56	.3	8.48	521
June	110	26	57.2	3,400
July	38	.1	14.1	867
August	4.6	.1	1.23	75.6
September	3.2	.8	1.53	91.0
The year	110	.1	8.09	5,870

MONO LAKE BASIN.

MONO LAKE NEAR MONO LAKE, CALIF.

LOCATION.—In lot 6, SE. ¼ NE. ¼ sec. 31, T. 2 N., R. 20 E., 2 miles south of Mono Lake post office, Mono County.

RECORDS AVAILABLE.—June 15, 1912, to September 30, 1920 (fragmentary).

GAGE.—Vertical staff on support of boat house, installed September, 1916; read occasionally by W. E. Green. Original gage was vertical staff fastened to willow tree about 400 feet from Hammon's store. Relation of datums of gages unknown.

EXTREMES OF STAGE.—1912-1920: Maximum stage recorded, 13.3 feet May 27, 1915; minimum stage 7.93 feet December 11, 1913.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Daily gage height, in feet, of Mono Lake near Mono Lake, Calif., for years ending September 30, 1919 and 1920.

1918.		**1919.**		**1920.**	
Oct. 16	2.2	Aug. 20	2.9	Apr. 7	2.5
1919.		Sept. 25	2.3	May 22	2.5
Apr. 24	3.0	Oct. 15	2.2	June 28	2.35
May 27	3.2	Nov. 8	2.0	July 19	2.2
June 23	3.35	Dec. 9	2.0	Aug. 24	1.7
July 18	3.55			Sept. 28	1.4

WALKER LAKE BASIN.

WALKER RIVER NEAR WABUSKA, NEV.

LOCATION—In NE. ¼ sec. 20, T. 15 N., R. 26 E., half a mile above boundary line of Walker River Indian Reservation, and 5 miles east of Wabuska, Lyon County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 15 to September 30, 1920. Comparable records were obtained July 22, 1902, to July 31, 1908, at the railroad bridge 3 miles upstream.

GAGE.—Stevens 8-day water-stage recorder on left bank with inside hook and outside inclined staff gages, installed July 28, 1920; inspected by Mrs. A. E. Parker. July 1-27, 1920, hook gage was read. January 15 to June 30, 1920, a temporary vertical staff was read.

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DISCHARGE MEASUREMENTS.—Made by wading or from cable 30 feet upstream.

CHANNEL AND CONTROL.—Banks fairly high and clean. One channel except at very high stages when abandoned channel on right may carry small quantity of water around gage. Bed of stream composed of sand.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 4.56 feet on June 4 (discharge, 259 second-feet); minimum stage, 3.23 feet September 23 (discharge, 4 second-feet).

ICE.—Some ice effect in winter.

DIVERSIONS.—Below all diversions above the Walker River Indian Reservation.

REGULATION.—None except by diversions.

ACCURACY.—Stage-discharge relation permanent during year except as affected by ice January 15-21. Rating curve well defined by 5 discharge measurements made in 1920 and 1921. Operation of water-stage recorder satisfactory July 28 to September 30. Gage read to half-tenths once a day January 15 to June 30 and to hundredths once a day July 1-27. Daily discharge ascertained by applying to rating table the daily gage reading or the daily mean gage height determined from recorder graph. Discharge interpolated January 16-21. Records good.

Discharge measurements of Walker River near Wabuska, Nev., during the year ending Sept. 30, 1920.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 15	J. W. Bones	[a] 4.49	162
June 28	Rowe and Dickinson	4.23	165

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Walker River near Wabuska, Nev., for the year ending Sept. 30, 1920.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		156	100	24	24	225	110	14	9
2		169	110	24	29	231	106	14	9
3		144	132	24	29	253	117	13	8
4		132	196	24	24	259	123	14	8
5		132	144	24	24	250	128	13	8
6		110	132	18	24	240	137	12	8
7		110	132	9	24	240	110	11	8
8		132	121	9	24	240	123	11	8
9		121	110	9	24	240	106	10	7
10		132	110	9	49	240	86	11	6
11		132	110	9	49	240	76	11	6
12		132	90	18	56	240	64	10	8
13		90	81	18	56	240	53	10	9
14		81	72	18	56	210	43	10	8
15	162	81	72	18	56	210	38	10	8
16		81	72	24	81	204	30	11	8
17		72	72	24	81	196	28	10	8
18		72	72	24	100	182	26	11	7
19	159	72	64	24	100	182	24	11	7
20		56	49	24	132	182	20	11	7
21		42	49	24	144	240	18	9	6
22	156	42	49	24	156	210	18	6	6
23	156	42	49	24	182	210	18	6	4
24	168	42	49	24	210	210	18	6	7
25	156	36	36	18	240	210	16	14	9
26	156	36	36	18	246	210	16	29	8
27	156	36	36	18	182	182	15	14	6
28	156	81	36	18	156	166	14	14	9
29	156	81	36	18	110	132	15	12	6
30	156	.....	29	18	132	132	15	11	6
31	156	.....	29	.....	196	.....	15	10	.....

NOTE.—Braced figure shows mean discharge for period indicated.

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Monthly discharge of Walker River near Wabuska, Nev., for the year ending Sept. 30, 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
January 15–31	.....	.....	158	5,330
February	169	36	91.2	5,250
March	198	29	79.8	4,910
April	24	9	19.3	1,150
May	246	24	96.6	5,940
June	259	132	214	12,700
July	137	14	55.7	3,420
August	29	6	11.6	713
September	9	4	7.4	440
The period	.....	.....	.....	39,900

WALKER RIVER AT SCHURZ, NEV.

LOCATION.—In sec. 36, T. 13 N., R. 28 E., 50 feet below Southern Pacific Railroad bridge at Schurz, Mineral County, 3 miles above Walker Lake, and 6 miles below diversion dam of Walker River Indian Reservation.

DRAINAGE AREA.—2,850 square miles (measured on topographic maps).

RECORDS AVAILABLE.—July 2, 1913, to September 30, 1920.

GAGE.—Inclined staff gage on right bank 50 feet below Southern Pacific Railroad bridge; installed November 14, 1916; read by J. G. Bradford.

DISCHARGE MEASUREMENTS.—Made by wading or from flume half a mile below gage.

CHANNEL AND CONTROL.—Bed composed of loose sand; shifts occasionally. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 6.50 feet from 5 p. m. May 31 to 5 p. m. June 1 (discharge, 1,970 second-feet); minimum discharge less than 0.5 second-foot.

Maximum discharge during year ending September 30, 1920, 187 second-feet on May 25 by current-meter measurement; no flow March 17 to May 16 and July 15 to September 30.

1913–1920: Maximum stage recorded, 11.0 feet June 8 and 9, 1914 (discharge, 2,530 second-feet); no flow August 17–30 and September 23 to October 18, 1913, and March 17 to May 16 and July 15 to September 30, 1920.

ICE.—Stage-discharge relation affected by ice during some winters.

DIVERSIONS.—Below all diversions.

REGULATION.—Flow affected by irrigation diversions above.

ACCURACY—Stage-discharge relation for stages below 200 second-feet changed during winter of 1918–19 and again during spring of 1920; permanent for high stages. Rating curves fairly well defined below 1,500 second-feet; extended above. Gage read to tenths twice daily when there was flow in river except June 25 to September 30, 1919, when the depth of the slight stream of water was measured daily. Gage-height record, October 20, 1918, to January 11, 1919, not sufficiently reliable to warrant publication of daily discharge; January 12 to April 12, 1919, unreliable. Daily discharge ascertained by applying daily mean gage height to rating table. Records poor prior to April 13, 1919; fair thereafter.

Discharge measurements of Walker River at Schurz, Nev., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
	J. W. Bones	2.30	212	Oct. 16	J. W. Bones	0.45	0.5
				1920.			
	do	2.45	187	Jan. 16	do	1.86	140
	do	3.15	419	May 25	R. R. Rowe	2.18	187
	A. B. Purton	5.45	1,400	June 28	Rowe and Dickinson	1.90	126

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Daily discharge, in second-feet, of Walker River at Schurz, Nev., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	14							567	1,970			
2	23							589	1,790			
3	59							604	1,440			
4	97							634	1,180			
5	163		260	180				626	1,100			
6	171							560	920			
7	176							553	716			
8	179							542	444			
9	179							532	370			
10	179	200						525	330			
11	182			187				491	271			
12	187							475	260			
13	190						343	475	250			
14	194						428	475	250			
15	198		230				428	465	195			
16	202						459	459	195	0.5	0.5	0.5
17	206						459	459	186			
18	210						459	459	186			
19	212						475	475	186			
20							475	760	181			
21							475	828	178			
22							475	886	154			
23							475	985	60			
24							483	1,180	1			
25	210	250	200				491	1,230				
26							491	1,260				
27							508	1,290	.5			
28							518	1,300				
29							532	1,680				
20							542	1,740				
31		.....					.....	1,900	.....			.....
1919-20.												
1			116	146	162	60			97	116		
2			116	146	146	65			97	130		
3			116	146	138	65			82	130		
4			146	116	138	65			82	122		
5		.5	146	116	131	65			82	113		
6			146	116	131	65			97	105		
7			162	88	131	60			97	97		
8			162	88	116	54			97	97		
9		6	162	88	116	54		0	97	82		
10		12	146	88	102	54			97	82		
11		12	146	116	91	54			97	68		
12		35	162	116	76	54			97	55		
13		65	162	116	76	54			97	15		
14		88	146	116	76	35			105	1		
15		88	162	116	65	27	0		139			
16	.5	88	162	140	65	1			139		0	0
17		88	162	138	63			1	130			
18		88	162	138	56			2	122			
19		88	162	138	54			18	113			
20		88	162	146	54			39	113			
21		88	162	154	54			85	122			
22		88	162	162	60			148	130	0		
23		88	146	170	60			148	139			
24		88	146	181	60	0		158	130			
25		88	116	178	60			183	134			
26		116	116	178	63			167	139			
27		116	116	170	65			148	148			
28		116	116	170	70			130	130			
29		116	116	162	54			113	127			
20		116	146	162	.....			97	123			
31		.....	146	162	.....		.....	97	.....			.....

NOTE.—Discharge Oct. 20, 1918, to Jan. 11, 1919, estimated from daily gage readings and two current-meter measurements; June 25 to Nov. 8, 1919, estimated from observer's notes. No record Jan. 12 to Apr. 12, 1919. Braced figures show mean discharge for periods indicated.

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Monthly discharge of Walker River at Schurz, Nev., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October		14	179	11,000
November			217	12,900
December			229	14,100
January 1–11			181	3,950
April 13–30			478	16,900
May	1,900	459	807	49,600
June	1,970		427	25,400
July			.5	31
August			.5	31
September			.5	30
1919–20.				
October			0.5	31
November	116		59.0	3,510
December	162	116	145	8,920
January	181	88	138	8,480
February	162	54	87.3	5,020
March	65	0	26.8	1,650
April	0	0	0	0
May	183	0	49.5	3,040
June	148	82	113	6,720
July	130	0	39.1	2,400
August	0	0	0	0
September	0	0	0	0
The year	183	0	54.8	39,800

WEST WALKER RIVER NEAR COLEVILLE, CALIF.

LOCATION.—In NE. ¼ NW. ¼ sec. 28, T. 8 N., R. 23 E., at mouth of Ross Canyon, at head of Antelope Valley, 400 feet east of State highway, 1.100 feet above Terry canal heading, 1.4 miles above Terry ranch house, 6 miles above Coleville, Mono County, and 40 miles southeast of Gardnerville, Nev.

DRAINAGE AREA.—245 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 18, 1915, to September 30, 1920; October 5, 1902, to July 31, 1908, a station was maintained half a mile above present gage.

GAGE.—Water-stage recorder on left bank built by S. P. Ferguson, Reno, Nev., installed August 15, 1919; inspected by T. F. Hardy. Also inside hook and outside vertical staff gages. From June 18, 1915, to August 15, 1919, same equipment (at a different datum) was located 1,030 feet downstream about 100 feet above Terry canal heading.

DISCHARGE MEASUREMENTS.—Made from cable 1,000 feet below present gage or by wading.

CHANNEL AND CONTROL.—Bed composed of large boulders. Fairly permanent riffle. Prior to August 15, 1919, stage-discharge relation affected at times by a temporary jetty built each year at the Terry canal heading. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, from water-stage recorder, 5.60 feet at 6 a. m. May 29 (discharge, 2,180 second-feet); minimum stage recorded, 1.52 feet September 26 and 27 (discharge, 50 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 4.62 feet at 11 p. m. May 18 (discharge, 1,500 second-feet); minimum stage, from water-stage recorder, 1.20 feet at 3 p. m. November 21 (discharge, 37 second-feet).

1915–1920: Maximum stage recorded, 5.75 feet at 4 a. m. June 17, 1917 (discharge, 2,400 second-feet); minimum discharge, 14 second-feet at 10 p. m. March 1916.

age-discharge relation not seriously affected by ice.

ONS.—Station is above all diversions except one small canal which diverts a minimum of 3 second-feet 1½ miles above.

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REGULATION.—A small reservoir, at Poor Lake, 17 miles upstream, capacity of which is not known, stores water from the spring floods and releases it later in the summer. Regulation is very slight.

ACCURACY.—At the site used prior to August 15, 1919, stage-discharge relation was fairly permanent during each of two conditions of flow—when backwater existed from a wing dam at heading of Terry canal, and when dam had been washed out by high water. Dam was in place April 10 to May 21 and July 9 to August 15, 1919. On August 15, 1919, station was moved upstream 1,030 feet to eliminate backwater effect. There was backwater from ice December 24–28, 1918, January 1–5, November 26 to December 1, December 12, 1919, to January 15, 1920, February 10 and 21–25, 1920. Operation of water-stage recorder satisfactory except for three short periods. Two fairly well defined rating curves used. Discharge ascertained by applying directly to rating table the daily mean gage height obtained from recorder graph October 1, 1918, to April 9, 1919, May 24 to July 7, 1919, and November 21, 1919, to June 20, 1920, except for periods of ice effect and when recorder was not operating; for other days, ascertained by indirect method, by estimation or interpolation. Records fair.

Discharge measurements of West Walker River near Coleville, Calif., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 9	J. W. Bones	2.39	88	Jan. 14	J. W. Bones	1.62	74
Apr. 12	do	3.13	212	May 27	R. R. Rowe	3.94	944
Aug. 15	do	[a] 1.69	78	July 2	do	3.15	458
Oct. 15	do	1.58	54				

[a] Gage height at old location 2.45.

Daily discharge, in second-feet, of West Walker River near Coleville, Calif., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	434	117	116		92	105	191	857	836	286	90	66
2	328	116	120		92	114	222	878	822	252	90	67
3	279	106	116	98	88	105	255	878	871	200	89	66
4	294	106	118		92	103	336	899	836	245	84	65
5	222	108	120		89	105	373	913	836	262	86	65
6	232	116	117	90	88	105	297	864	843	258	90	64
7	200	120	117	89	92	97	269	829	808	255	86	63
8	182	106	112	88	92	97	228	808	732	252	84	63
9	182	116	106	83	92	101	191	753	808	255	82	60
10	164	116	89	84	97	96	200	706	766	258	78	59
11	152	118	122	86	90	105	209	794	658	238	77	57
12	141	116	116	83	72	101	241	843	576	212	76	56
13	134	117	118	84	101	97	251	878	528	209	76	56
14	130	116	116	84	94	96	222	934	495	212	77	57
15	164	110	110	84	101	94	245	920	538	209	78	57
16	259	96	110	88	101	103	286	906	512	216	77	56
17	232	110	101	88	92	97	344	850	501	179	77	56
18	191	120	96	90	96	101	403	850	538	166	77	56
19	169	118	106	89	97	103	421	934	592	157	78	56
20	159	110	101	88	94	101	421	948	576	150	78	56
21	148	103	101	88	101	101	444	1,100	565	150	77	55
22	143	117	97	90	96	99	485	1,180	538	200	74	55
23	139	117	92	89	96	92	506	1,260	506	162	71	55
24	132	101		88	101	101	517	1,340	495	141	69	55
25	126	110		86	101	101	517	1,260	501	126	68	55
26	120	106	90	92	94	120	485	1,380	454	116	65	50
27	120	130		89	88	122	408	1,530	425	114	65	50
28	120	106		88	103	126	439	1,630	408	106	67	52
29	120	120	99	86	.....	130	554	1,960	369	99	71	55
30	120	122	96	92	.....	152	760	1,480	336	94	69	58
31	118	.....	106	96	.....	166	.....	1,030	.....	92	67	.....

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Daily discharge, in second-feet, of West Walker River near Coleville, Calif., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	57	72	70		82	110	107	461	1,060	461	134	83
2	57	69	71		83	102	110	414	1,060	486	128	86
3	58	67	72	70	84	88	116	399	1,120	461	130	89
4	56	68	77		84	92	124	426	1,120	418	134	95
5	55	65	72		83	90	158	449	1,040	418	128	99
6	52	60	77		83	89	191	516	1,090	410	122	92
7	53	57	73		82	88	206	591	1,150	392	119	75
8	51	67	74	60	83	87	209	591	1,220	366	116	78
9	52	63	72		77	87	193	581	1,190	380	109	90
10	52	71	63		75	86	174	503	1,080	356	109	90
11	53	72	65		73	86	160	482	1,190	324	107	78
12	52	69		65	75	89	166	525	1,140	298	104	73
13	52	68			78	98	191	543	1,190	260	100	71
14	53	72		71	77	102	198	508	874	228	91	68
15	53	71	65	70	78	91	198	611	813	236	89	68
16	54	66		75	73	87	178	784	784	239	88	68
17	55	66		77	71	92	176	992	784	251	86	67
18	55	65		78	75	91	178	1,150	938	242	86	67
19	54	75		79	77	94	186	1,330	1,010	228	84	66
20	55	71		84	69	98	196	1,360	1,040	206	83	63
21	57	58		79		107	183	1,410	1,070	191	79	62
22	59	66	75	80		100	186	1,250	1,050	186	79	63
23	58	71		82	70	94	188	1,060	899	181	73	64
24	59	75		79		98	191	849	667	193	68	66
25	57	72		84		102	193	778	591	186	143	68
26	62			82	71	86	209	855	548	169	124	68
27	64			83	83	100	251	965	478	160	124	71
28	65	70		86	84	100	331	1,100	461	156	107	68
29	69		70	83	78	106	418	1,250	449	149	96	67
30	66			84	.....	102	503	1,260	426	145	86	66
31	63	.....		82	.....	114	.....	1,120	.....	141	83	.....

NOTE.—Braced figures indicate mean discharge for the periods included.

Monthly discharge of West Walker River near Coleville, Calif., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	434	118	182	11,200
November	130	96	113	6,720
December	122	.....	105	6,460
January	.....	83	89.4	5,500
February	103	72	94.0	5,220
March	166	92	108	6,640
April	760	191	357	21,200
May	1,960	706	1,040	64,000
June	871	336	609	36,200
July	286	92	189	11,600
August	90	65	77.2	4,750
September	67	50	58.0	3,450
The year	1,960	50	253	183,000
1919–20.				
.....	69	51	56.7	3,490
.....	75	57	68.2	4,060
.....	.....	.....	71.0	4,370
.....	86	.....	73.6	4,530
.....	84	.....	76.8	4,420
.....	114	86	95.4	5,870
.....	503	107	202	12,000
.....	1,410	399	810	49,800
.....	1,220	426	918	54,600
.....	486	141	275	16,900
.....	143	68	104	6,390
.....	95	62	73.0	4,340
.....	1,410	51	235	171,000

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WEST WALKER RIVER NEAR WELLINGTON, NEV.

LOCATION.—In sec. 10, T. 10 N., R. 23 E., in canyon between Antelope and Smith valleys, in Douglas County three-quarters of a mile above Lyon County line, a quarter of a mile above Plymouth canal on right and Colony or Simpson canal on left, 1 mile below head of Saroni canal, and 1 mile above Wellington, Nev.

DRAINAGE AREA.—521 square miles (measured on topographic map).

RECORDS AVAILABLE.—December 20, 1917, to September 30, 1920.

GAGE.—Stevens 8-day water-stage recorder on right bank; inspected by J. W. Pierce. Also inside float gage and outside staff gage.

DISCHARGE MEASUREMENTS.—Made by wading near gage or from Hoye bridge about 2 miles upstream.

CHANNEL AND CONTROL.—One channel at all stages. Banks not subject to overflow. Stream bed composed of boulders and gravel.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 5.24 feet at 3 a. m. May 30 (discharge, 1,940 second-feet); minimum stage recorded, 0.74 foot August 19 and 20 (discharge, 26 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 3.65 feet from 5 to 9 p. m. May 30 (discharge, 1,030 second-feet); minimum stage recorded, 0.68 foot August 23 and 24 (discharge, 23 second-feet).

1918–1920: Maximum stage, from water-stage recorder, 5.24 feet at 3 a. m. May 30, 1919 (discharge, 1,940 second-feet); minimum stage recorded, 0.68 foot August 23 and 24, 1920 (discharge, 23 second-feet).

ICE.—Stage-discharge relation affected by ice during winter.

DIVERSIONS.—Station is below all diversions and return water in Antelope Valley and above all diversions in Smith Valley except Saroni canal, records of flow for which are given on page 196.

REGULATION.—None except by diversions.

ACCURACY.—Stage-discharge relation changed about May 23, 1920, during high water; affected by ice for short periods each winter. Rating curve used until May 22, 1920, well defined between 25 and 1,500 second-feet; curve used thereafter fairly well defined. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph, except for periods of ice effect or incomplete gage-height record. For these periods discharge was interpolated or estimated from current-meter measurements, temperature records, and comparison with flow of West Walker River near Coleville, Calif. Records fair.

Discharge measurements of West Walker River near Wellington, Nev., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 11	J. W. Bones	[a] 2.55	106	Jan. 13	J. W. Bones	[a] 1.52	72
Apr. 13	do	1.88	182	July 2	R. R. Rowe	2.36	402
June 1	A. B. Purton	3.69	995				
Aug. 16	J. W. Bones	.81	30.0				
Oct. 15	do	1.05	43.9				

[a] Stage-discharge relation affected by ice.

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Daily discharge, in second-feet, of West Walker River near Wellington, Nev., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	226	108			74	90	163	730	1,020	136	39	30
2	296					92	176	810	864	124	40	29
3	257					93	199	790	840	111	38	28
4	226				80	95	232	830	815	102	36	27
5	217			105		97	306	809	790	93	36	28
6	185					98	302	788	780	87	37	28
7	185				84	100	271	766	745	81	36	29
8	160				84	97	242	745	690	69	35	30
9	156				98	90	214	724	665	58	33	29
10	158					90	202	702	615	68	31	28
11	143			106	110	87	179	681	520	69	32	26
12	131					89	176	660	445	62	32	26
13	124					90	185	705	384	58	33	26
14	117					90	194	700	328	54	33	26
15	119				115	87	204	760	292	55	31	26
16	143	105	105	100	112	87	213	795	292	66	29	26
17	182				108	88	222	765	285	97	29	26
18	171				104	89	232	715	271	89	26	26
19	148				100	92	241	730	271	75	26	26
20	136				96	100	250	800	268	63	26	26
21	129				92	119	260	800	250	56	26	26
22	124				88	138	270	990	250	59	26	26
23	121			85	84	156	281	1,280	250	66	26	27
24	118				84	146	291	1,260	244	64	26	27
25	115				84	129	301	1,290	220	57	27	28
26	111			71	90	130	312	1,280	205	48	28	28
27	108			69	84	132	322	1,310	202	44	28	29
28	108			67	87	134	332	1,340	185	41	28	29
29	106			67	.....	136	380	1,530	174	38	28	30
30	111			69	.....	138	530	1,770	156	38	29	34
31	113	.....		71	.....	150	.....	1,410	.....	38	30	.....
1919–20.												
1	37	56	76	73	74	85		211	975	394	49	34
2	38	56	79	72		122	85	199	925	398	50	34
3	39	56	80	72		110		199	925	407	49	38
4	41	57	79	71		90		187	930	398	44	39
5	42	57	81	70	72	84	97	185	915	389	42	40
6	42	58	83	67		78		199	885	380	41	41
7	41	59	78	66		72		238	850	363	43	36
8	40	59	74	67		66	84	285	885	330	45	35
9	39	60	67	61	70	66		352	910	294	49	35
10	38	61	70	60	69	72		348	895	279	45	36
11	37	62	76	64	66	72	71	310	800	264	41	38
12	36	63	80	70	67	72	71	299	768	217	39	39
13	39	64	74	72	67	72	68	364	735	177		42
14	43	65	66	72	68	74	63	380	687	148		45
15	46	66	66	69	68		64	356	653	126		
16	44	67	67	67			72	432	629	136		40
17	42	68	69	62		62	71	550	596	148	32	
18	40	68	71	71			76	705	644	160		
19	38	68	75	83	70		75	815	690			35
20		68	78	80			70	894	735			35
21		67	80	81		50	69	942		128		36
22		69	80	81	71	53	64	954			24	34
23	47	69	79	81		53	62	915			23	31
24		72	79	79		52	60	775	580		26	33
25		74	79	76		48	57	663		94	39	34
26		74	78	78	78	51	63	634			43	34
27	56	70	76	78		54	67	667	420		46	
28	56	68	75	76		58	67	785	398	72	42	35
29	56	67	75	76	84		90	865	402		39	
30	56	72	74	75	.....	68	140	950	389		36	
31	56	.....	74	75	.....		.....	990	.....		34	.....

NOTE.—No gage-height record, and discharge interpolated Oct. 23, 24, 1918, Feb. 16–22, Mar. 2–6, 21, 22, 26–29, Apr. 13–19, 21–27, May 5–11, July 6, 13, 27, Aug. 11, 29–31, Sept. 15–21, 23–28, Oct. 6–11, 13, 14, 16–18, 20–26, Nov. 4–8, 10–15, Dec. 30, 31, 1919, Jan. 1–3, 30–31, Feb. 2–8, 10, 16–21, 23–28, Mar. 15–20, 29–31, Apr. 1–4, 6–10, June 12, 18, 19, 21–26, July 10, 17, 19–24, 26–31, Aug. 7, 13–21, 28, Sept. 4–5, 10–11, 15–18, and 27–30, 1920. Discharge estimated because of no gage-height record, or ice effect, Nov. 2, 1918, to Jan. 10, 1919, Jan. 11–25, Feb. 2–6, 10–14, Nov. 27–29, Dec. 10–13, 15–20, 1919, and Jan. 10–15, 1920. Braced figures show mean discharge for periods indicated.

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Monthly discharge of West Walker River near Wellington, Nev., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	296	106	153	9,410
November	.....	.....	105	6,250
December	.....	.....	105	6,460
January	.....	.....	93.4	5,740
February	.....	.....	93.5	5,190
March	156	87	108	6,640
April	530	163	256	15,200
May	1,770	660	944	58,000
June	1,020	156	444	26,400
July	136	38	69.9	4,300
August	40	26	31.0	1,910
September	30	26	27.7	1,650
The year	1,770	26	203	147,000
1919-20.				
October	56	36	44.2	2,720
November	74	56	64.7	3,850
December	83	66	75.4	4,640
January	83	60	72.4	4,450
February	84	67	72.3	4,160
March	122	48	68.7	4,220
April	140	57	76.6	4,560
May	990	185	537	33,000
June	975	389	704	41,900
July	407	.....	203	12,500
August	50	23	38.0	2,340
September	45	31	36.8	2,190
The year	990	23	163	121,000

WEST WALKER RIVER AT HUDSON, NEV.

LOCATION.—About sec. 11, T. 11 N., R. 24 E., at highway bridge at Hudson, Lyon County, 1 mile above canyon between Smith and Mason valleys.

DRAINAGE AREA.—953 square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 3, 1914, to September 30, 1920.

GAGE.—Vertical staff fastened to downstream pile in middle bent of highway bridge; read by Theo. Schneider.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of loose sand; light gravel riffle. One channel at all stages. Gage height of zero flow about 1.5 feet.

EXTREMES OF DISCHARGE.—Maximum discharge during year ending September 30, 1919, not accurately determined, probably in excess of 1,900 second-feet on May 30; minimum discharge not determined, probably less than 18 second-feet at times in August and September.

Maximum stage recorded during year ending September 30, 1920, 5.0 feet May 20-22 (discharge, 960 second-feet); minimum stage, 2.2 feet August 7 to September 21 (discharge, 13 second-feet).

1914-1920: Maximum stage recorded, 6.9 feet at 5 p. m. June 18 and 7 a. m. June 19, 1917 (discharge, 2,200 second-feet); minimum stage, 2.2 feet August 7 to September 21, 1920 (discharge, 13 second-feet).

ICE.—Stage-discharge relation affected by ice at times.

DIVERSIONS.—Below all diversions in Smith Valley and above those in Mason Valley.

REGULATION.—None.

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ACCURACY.—Stage-discharge relation changed slightly about June 1, 1920, during high water; affected by ice during part of each winter. Rating curves well defined. Gage read to tenths once a day with some omissions and many cases of doubtful accuracy. Daily discharge ascertained by applying daily gage height to rating table, except for periods of ice effect and periods when gage readings were considered doubtful. For these periods discharge was estimated from comparison with West Walker River near Wellington, Nev. Records poor.

Discharge measurements of West Walker River at Hudson, Nev., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 12	J. W. Bones	[a] 3.08	121	Jan. 15	J. W. Bones	[a] 2.71	72.
Apr. 13	do	3.34	188	May 26	R. R. Rowe	3.95	390
June 1	A. B. Purton	5.15	1,058	July 1	do	3.77	302
Aug. 16	J. W. Bones	2.20	20.6				
Oct. 15	J. W. Bones	2.50	47.6				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of West Walker River at Hudson, Nev., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	219	179				157	204	752	1,060	117	24	
2	283	179				157	204	870		117		
3	318	179				168	219	930		101		
4	266	179				179	250	960		85		
5	266	179			120	179	318	960		85		
6	234	179		120		179	396	960		71		
7	219	179				179	490	900		71		
8	179	179				179	466	840		71		
9	179	179			146	179	418	724	700	71	22	
10	179	179	130		168	168	234	670		78		
11	179	179			192	168	204			71		
12	179	179		121	204	179	179			59		
13	179	179			219	168	192			59		
14	179	179			219	168	204			59		
15	204	179			192	179	179			59		
16	234	179			179	168	179	730	300	59	20	20
17	234	157			179	168	192			59		
18	204	168			179	168	219			65		
19	204	179			179	168	234			78		
20	179	179	117		157	179	318			93		
21	179	168	117	120	157	192	318			117		
22	179	157	117		136	192	336			117		
23	179	146	117		117	179	336		200	109		
24	179	146	117		117	192	356			101	18	
25	179	146	117		117	192	396	1,300		78		
26	179	146			117	204	418			71		
27	179				146	204	442			71		
28	179	140	120		157	204	540			71		
29	179				.....	204	515			42		
30	179				.....	204	540	1,900		27		
31	179	.....			.....	204	.....	1,500	.....	27		.....

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Daily discharge, in second-feet, of West Walker River at Hudson, Nev., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1		71				117	71	146	697	304	26	13
2		71				126	71	168	720	336	26	13
3		71				146	71	136	720	356	19	13
4		71				157	71	136	690	296	19	13
5		71				136	71	146	660	262	19	13
6		78				117	71	168	690	215	19	13
7	40	85		70		117	71	219	660	188	13	13
8		85				117	71	283	603	176	13	13
9		85				101	71	318	549	163	13	13
10		85				101	71	396	523	163	13	13
11		85				101			497	163	13	13
12		85				101			497	163	13	13
13		85				85		400	424	163	13	13
14		85				85	71		400	140	13	13
15	47	85		72	85	85			400	120	13	13
16		85	75			85			400	111	13	13
17		85				85		700	400	71	13	13
18	47	85				85	71		400	58	13	13
19		85				85	71		400	58	13	13
20		85				85	71	960	400	58	13	13
21	47	85				85	71	960	549	58	13	13
22	53	85				85	71	960	603	58	13	16
23	59	85		75		85	71	900	576	58	13	19
24	59	85				85	71	670	447	58	13	19
25	65	85				85	71	515	296	58	13	19
26	71					85	71	490	230	58	13	19
27	71					85	71	490	188	58	13	19
28	71	80				85	78	618	188	40	13	19
29	71					71	101	670	188	35	13	19
30	71				.....	71	126	670	202	26	13	19
31	71	.....			.....	71	.....	670	.....	26	13	.....

NOTE.—Braced figures show mean discharge for periods indicated.

Monthly discharge of West Walker River at Hudson, Nev., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	318	179	203	12,500
November	179	.....	167	9,940
December	.....	.....	126	7,750
January	.....	.....	120	7,380
February	219	.....	151	8,390
March	204	157	181	11,100
April	540	179	317	18,900
May	1,900	670	999	61,400
June	.....	.....	465	27,700
July	117	27	76.1	4,680
August	.....	.....	20.1	1,240
September	.....	.....	20.0	1,190
The year	1,900	.....	238	172,000
1919-20.				
October	71	.....	50.0	3,070
November	85	71	81.6	4,860
December	.....	.....	75.0	4,610
January	.....	.....	72.6	4,460
February	.....	.....	85.0	4,890
March	157	71	97.1	5,970
April	126	71	74.1	4,410
May	960	136	500	30,700
June	720	188	473	28,100
July	356	26	132	8,120
August	26	13	14.6	898
September	19	13	14.7	875
The year	960	13	139	101,000

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SARONI CANAL NEAR WELLINGTON, NEV.

LOCATION.—In sec. 10, T. 10 N., R. 23 E., in canyon between Antelope and Smith Valleys, Douglas County, 1 mile below head of canal and 1 mile above Wellington, Lyon County; 150 feet east and 200 feet upstream from station on West Walker River.

RECORDS AVAILABLE.— May 26 to September 30, 1920.

GAGE.—Vertical enamel staff at upstream end of left abutment of bridge.

DISCHARGE MEASUREMENTS.—Made by wading or from bridge.

CHANNEL AND CONTROL.—One channel at all stages. Control is gravel section of canal.

ICE.—Canal dry during winter.

DIVERSIONS.—None above station.

REGULATION.—By headgates.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to hundredths once a week with occasional additional readings. Discharge determined by applying gage readings to rating table. For intermediate periods discharge estimated from notes by ditch rider or interpolated. Records fair.

Canal diverts water in sec. 15, T. 10 N., R. 23 E., from right bank of West Walker River for use in Smith Valley. Combined flow of Saroni canal and West Walker River near Wellington shows quantity of water flowing from Antelope Valley.

Discharge measurements of Saroni canal near Wellington, Nev., during the year ending Sept. 30, 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 26	R. R. Rowe	2.18	90	July 9	Malone and Scott	0.78	16.2
June 20	L. S. Scott	.....	87	12	L. S. Scott	.....	9.6
July 1	R. R. Rowe	1.73	57	Aug. 24	A. J. Aikens [b]	.....	2.8
9	Malone [a] and Scott [b]	1.31	34.9	Sept. 15	do	.....	3.0

[a] Water supervisor. [b] Hydrographer for water supervisor.

Daily discharge, in second-feet, of Saroni canal near Wellington, Nev., for the period July 1 to Sept. 30, 1920.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1	57	4	3	11	16	2	5	21	0	3	
2	51	4	3	12	13	1	5	22	0	6	
3	48	4	3	13	10	1	4	23	0	5	4
4	46	4	3	14	10	0	4	24	0	3	
5	43	4	3	15	10	0	3	25	0	3	
6	40	9	3	16	10	0		26	0	3	4
7	37	8	3	17	10	0		27	0	3	
8	34	7	4	18	5	0	3	28	0	3	6
9	26	2	4	19	0	0		29	0	3	
10	16	2	5	20	0	0		30	2	3	
								31	4	3	.....

Monthly discharge of Saroni canal near Wellington, Nev., for the period July 1 to Sept. 30, 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
July	57	0	15.7	965
August	[illegible]	0	2.9	178
September	.....	.....	3.9	232
The period	.....	.....	.....	1,380

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HUMBOLDT-CARSON SINK BASIN.

CARSON RIVER BASIN.

EAST FORK OF CARSON RIVER NEAR MARKLEEVILLE, CALIF.

LOCATION.—In NE. ¼ sec. 27, T. 10 N., R. 20 E., at Hangman's Bridge, 2 miles east of Markleeville, Alpine County. Indian Creek enters 100 feet above gage and Markleeville Creek 1½ miles below.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 13, 1910, to September 30, 1920 (not complete).

GAGE.—Vertical staff, 75 feet below bridge, bolted to rock ledge on right bank; read by W. J. Clark.

DISCHARGE MEASUREMENTS.—Made from cable installed April 16, 1914, 400 feet below gage or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; appear permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 6.25 feet May 26 (discharge, 1,400 second-feet); minimum stage 2.60 feet November 1 (discharge, 60 second-feet).

Maximum stage recorded during the year ending September 30, 1920, 5.3 feet May 27 (discharge, 846 second-feet); minimum stage, 2.45 feet September 6 (discharge, 44 second-feet).

1910–1920: Maximum stage recorded, 7.7 feet June 7, 1911 (discharge not determined); minimum stage, 1.45 feet September 20, 1913 (discharge, 6 second-feet).

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—No information.

REGULATION.—Low-water flow augmented by storage developed on Silver Creek above station.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined above 40 second-feet. Gage read to half-tenths occasionally. Daily discharge ascertained by applying gage height to rating table. Records good. Gage-height record too fragmentary to allow determination of monthly discharge.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of East Fork of Carson River near Markleeville, Calif., during the years ending Sept. 30, 1919 and 1920.

[Made by H. D. McGlashan.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1919.	*Feet.*	*Sec.-ft.*	1920.	*Feet.*	*Sec.-ft.*
June 27	3.80	296	July 27	3.00	94

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Daily discharge, in second-feet, of East Fork of Carson River near Markleeville, Calif., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.								
1		60						
2								
3						204		
4								
5						184	81	
6								
7								
8						156		
9						156		
10								
11								
12						138		
13		70						
14								
15				1,130	385			
16				1,130	418			
17	104			1,070				
18				1,130	385			
19								
20								
21								
22				1,400	326	114		
23	70							
24								
25								
26				1,400				99
27					272			
28	64					85		
29						85		
30								
31							85	
1919–20.								
1		60						
2								
3	99							
4								49
5							78	
6								44
7							92	
8								
9					794			
10					794		72	
12								51
13							72	50
14								
15					587			
11							66	
16								
17							54	
18	49							
19								
20	49		204		546			
21					488			
22							49	
23		64						
24		53		745				
25								
26								
27				846		111		
28								
29								
30								
31							54	

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CARSON RIVER NEAR EMPIRE, NEV.

LOCATION.—In sec. 12, T. 15 N., R. 20 E., just below tailrace of Brunswick mill, a quarter of a mile below highway bridge, and 2 miles below Empire, Ormsby County.

DRAINAGE AREA.—988 square miles (measured on topographic map).

RECORDS AVAILABLE.—June 25 to December 31, 1895; October 21, 1900, to September 30, 1920.

GAGE.—Inclined staff on left bank used since February 24, 1911.

DISCHARGE MEASUREMENTS.—Made from cable a quarter of a mile above gage or by wading just above bridge. When made from cable the power canal is measured and this quantity added.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders, fairly permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum daily mean stage during year ending September 30, 1919, 6.8 feet May 30 (discharge, 2,630 second-feet); minimum daily mean stage, 2.2 feet August 20 and 21 (discharge, 6 second-feet).

Maximum daily mean stage during year ending September 30, 1920, 5.5 feet on May 20 (discharge, 1,350 second-feet); minimum daily mean stage, 2.1 feet September 23–25 (discharge, 5 second-feet).

1900–1920: Maximum stage recorded, 8.0 feet January 23, 1914 (discharge, 5,160 second-feet); minimum stage 0.7 foot August 31, and September 4, 5, and 14, 1905 (discharge, zero).

ICE.—No information.

DIVERSIONS.—A large amount of water is diverted above the station for irrigation in Carson Valley. The water diverted by the Brunswick mill power canal is returned to river above gage.

COOPERATION.—Records of daily discharge furnished by the United States Reclamation Service.

Discharge measurements of Carson River near Empire, Nev., during the years ending Sept. 30, 1919 and 1920.

[Made by R. E. Hartley.[a]]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1919.	*Feet.*	*Sec.-ft.*	1920.	*Feet.*	*Sec.-ft.*
Apr. 23	5.31	1,145	May 15	4.57	652
June 14	4.00	291			

[a] Engineer for U. S. Reclamation Service.

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Daily discharge, in second-feet, of Carson River near Empire, Nev., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	81	100	160	200	160	335	440	1,620	1,620	81	9	8
2	240	100	160	200	160	285	500	2,000	1,260	65	9	8
3	240	81	160	200	160	385	285	2,100	1,000	52	9	8
4	160	81	160	200	200	335	285	2,100	845	52	8	8
5	160	81	160	200	200	240	385	2,200	770	30	8	8
6	160	81	160	200	200	240	240	2,100	700	22	8	8
7	125	81	160	160	160	240	440	2,300	630	16	8	8
8	125	81	125	160	160	285	565	1,800	565	16	8	8
9	160	81	125	160	240	240	630	1,620	500	16	8	8
10	125	81	200	125	285	240	565	1,350	440	16	8	8
11	160	100	200	125	700	200	630	1,260	385	12	8	8
12	160	100	160	125	920	200	500	1,260	335	12	8	8
13	125	100	160	125	770	200	565	1,260	285	12	8	8
14	125	100	125	160	630	200	565	1,260	240	10	8	8
15	125	100	125	160	440	200	440	1,260	200	10	8	8
16	125	100	125	160	440	200	440	1,260	200	10	8	8
17	125	125	160	160	240	200	500	1,260	200	16	7	8
18	125	125	160	160	200	200	565	1,170	160	16	7	8
19	125	160	160	160	240	200	700	1,170	125	12	7	8
20	125	160	160	200	240	200	920	1,080	125	12	6	8
21	100	160	125	200	200	240	1,000	1,170	125	10	6	8
22	100	160	160	200	200	240	1,170	1,170	125	10	7	8
23	100	160	160	200	200	240	1,170	1,530	100	9	7	8
24	100	160	160	200	200	240	1,260	1,530	100	9	8	8
25	100	160	160	160	240	240	1,350	1,530	100	9	8	8
26	100	160	160	160	240	285	1,170	1,620	81	9	8	8
27	100	160	160	160	240	285	920	1,620	81	9	8	8
28	100	125	200	160	335	335	700	1,620	65	10	8	8
29	100	125	200	200	.....	385	565	1,800	65	10	8	8
30	100	125	285	160	.....	385	630	2,630	65	10	8	9
31	100	.....	200	160	.....	500	.....	2,200	.....	9	8	.....
1919–20.												
1	9	52	65	125	160	125	125	500	920	700	12	8
2	8	52	52	125	160	160	125	385	700	845	12	8
3	8	52	52	125	160	160	125	335	700	700	12	8
4	8	52	65	125	160	240	125	285	700	565	12	8
5	8	52	65	200	125	160	125	285	700	440	16	8
6	8	52	81	200	125	160	160	285	700	335	12	7
7	9	65	100	200	125	125	200	335	700	285	12	7
8	9	65	125	200	125	125	240	385	845	240	10	7
9	9	65	200	160	125	125	240	565	700	200	10	7
10	9	65	240	160	125	125	125	630	700	160	10	7
11	9	65	285	160	125	125	200	630	770	65	9	7
12	10	65	335	160	125	125	200	565	770	65	9	7
13	10	65	335	125	125	125	200	500	700	65	9	7
14	10	65	240	125	125	125	200	500	700	52	9	7
15	10	65	200	125	125	125	240	500	630	52	9	7
16	10	65	200	125	125	125	240	920	500	40	8	6
17	10	65	200	125	125	125	285	1,000	440	40	8	6
18	10	81	200	125	100	125	240	1,080	440	30	8	6
19	12	81	200	160	100	125	240	1,170	500	22	8	6
20	12	81	200	160	100	125	240	1,350	440	22	8	6
21	16	81	200	160	100	125	240	1,230	385	22	8	6
22	22	81	160	160	100	125	240	1,170	385	16	8	6
23	30	81	160	160	100	125	240	1,000	335	16	8	5
24	30	81	160	160	125	125	240	920	335	16	8	5
25	30	81	160	160	125	125	240	920	285	16	8	5
26	40	81	200	160	125	125	200	630	240	16	12	6
27	40	81	200	160	125	125	160	565	240	16	9	6
28	40	81	160	160	125	125	240	630	240	16	8	7
29	52	81	160	160	125	125	285	700	285	16	8	7
30	52	81	160	160	.....	125	335	770	385	16	8	7
31	52	.....	160	160	.....	125	.....	700	.....	16	8	.....

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Monthly discharge of Carson River near Empire, Nev., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	240	81	129	7,930
November	160	81	117	6,960
December	285	125	163	10,000
January	200	125	171	10,500
February	920	160	307	17,000
March	500	200	265	16,300
April	1,350	240	670	39,900
May	2,630	1,080	1,610	99,000
June	1,620	65	383	22,800
July	81	9	19.1	1,170
August	9	6	7.8	480
September	9	8	8.0	478
The year	2,630	6	321	233,000
1919-20.				
October	52	8	19.1	1,170
November	81	52	69.3	4,120
December	335	52	172	10,600
January	200	125	154	9,470
February	160	100	125	7,190
March	240	125	133	8,180
April	335	125	210	12,500
May	1,350	285	693	42,600
June	920	240	546	32,500
July	845	16	165	10,100
August	16	8	9.6	587
September	8	5	6.7	397
The year	1,350	5	192	139,000

NOTE.—Monthly discharge computed by the U. S. Geol. Survey.

CARSON RIVER NEAR FORT CHURCHILL, NEV.

LOCATION.—In sec. 5, T. 16 N., R. 23 E., 1 mile west of Clifton station, on Mound House-Churchill branch of Southern Pacific Railroad, 9 miles west of Fort Churchill, Lyon County, and 10 miles below Dayton.

DRAINAGE AREA.—1,200 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 13, 1911, to September 30, 1920.

GAGE.—Inclined staff on right bank with vertical extension for high water.

DISCHARGE MEASUREMENTS.—Made from suspension bridge 500 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel; shifts occasionally.

EXTREMES OF DISCHARGE.—Maximum daily mean stage during year ending September 30, 1919, 8.9 feet May 31 (discharge, 3,140 second-feet); minimum daily mean stage, 3.0 feet September 1-30 (discharge, 2 second-feet).

Maximum daily mean stage during year ending September 30, 1920, 7.4 feet on May 21 (discharge, 1,680 second-feet); minimum daily mean stage, 3.0 feet October 1-2 (discharge, 2 second-feet).

1911-1920: Maximum stage, 11.5 feet January 26, 1914 (discharge, 6,150 second-feet); minimum stage, 3.0 feet September 1 to October 2, 1919 (discharge, 2 second-feet).

ICE.—No information.

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DIVERSIONS.—Carson and Dayton valleys are irrigated above the station.

REGULATION.—Flow affected by diversions.

COOPERATION.—Records of daily discharge furnished by United States Reclamation Service.

Discharge measurements of Carson River near Fort Churchill, Nev., during the years ending Sept. 30, 1919 and 1920.

[Made by R. E. Hartley.[a]]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1919.	*Feet.*	*Sec.-ft.*	1919.	*Feet.*	*Sec.-ft.*	1920.	*Feet.*	*Sec.-ft.*
Apr. 23	6.75	1,110	June 14	5.10	249	May 15	5.70	595
25	7.01	1,330	23	4.43	191			
June 3	6.76	1,070	Oct. 15	3.25	12.6			

[a] Engineer for U. S. Reclamation Service.

Daily discharge, in second-feet, of Carson River near Fort Churchill, Nev., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	44	127	156	166	148	227	470	1,680	2,260	54	9	2
2	44	117	156	166	166	272	505	2,160	1,680	54	9	2
3	225	117	146	272	166	377	542	2,260	932	41	9	2
4	200	117	136	296	166	322	759	2,350	870	41	9	2
5	177	117	177	272	148	272	812	2,260	812	41	9	2
6	156	117	200	272	148	249	1,000	2,440	759	29	9	2
7	146	117	188	227	166	227	621	2,260	664	29	9	2
8	127	108	200	185	166	227	505	2,060	581	29	9	2
9	156	108	225	166	185	205	505	1,780	505	29	9	2
10	156	99	225	227	249	205	437	1,680	470	18	9	2
11	166	117	212	227	621	205	437	1,600	437	18	9	2
12	166	117	136	166	932	205	437	1,600	406	18	9	2
13	177	136	177	131	437	205	505	1,600	349	18	9	2
14	136	136	166	114	377	205	505	1,600	322	18	9	2
15	146	146	188	131	272	205	437	1,500	322	18	9	2
16	136	146	188	166	249	166	406	1,500	296	18	9	2
17	136	177	200	148	227	166	406	1,420	272	18	9	2
18	136	188	200	166	227	166	542	1,320	249	18	9	2
19	156	166	200	166	205	185	664	1,150	227	18	9	2
20	156	166	188	166	205	227	759	1,150	205	18	9	2
21	156	188	200	185	205	227	812	1,320	205	18	9	2
22	136	188	212	166	205	227	932	1,500	185	18	9	2
23	136	188	212	148	205	227	1,000	1,680	166	18	9	2
24	136	200	200	185	205	227	1,150	1,680	166	18	9	2
25	136	200	212	185	205	249	1,320	1,680	148	18	4	2
26	136	200	177	185	205	249	1,420	1,780	131	18	4	2
27	136	188	156	166	205	272	1,240	1,780	114	18	4	2
28	117	177	136	166	185	349	1,150	1,680	98	9	4	2
29	127	177	136	166	.....	377	1,080	2,160	68	9	4	2
30	136	177	177	148	.....	406	1,500	2,440	54	9	4	2
31	127	.....	200	148	.....	437	.....	3,140	.....	9	4	.....

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Daily discharge, in second-feet, of Carson River near Fort Churchill, Nev., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	2	54	166	166	185	148	166	227	932	759	9	9
2	2	68	166	166	185	185	166	272	759	664	9	9
3	4	68	148	166	185	249	166	272	812	470	9	4
4	4	68	148	166	185	249	166	249	621	437	9	9
5	4	68	148	166	185	227	166	249	710	377	9	9
6	4	68	166	148	185	205	166	249	621	349	9	9
7	4	68	227	131	185	185	166	249	664	296	9	9
8	4	68	205	114	166	185	166	349	621	205	9	9
9	4	83	185	114	166	166	166	505	664	185	9	4
10	4	83	185	114	166	166	166	542	581	131	9	4
11	9	83	166	114	148	166	166	505	621	114	9	4
12	9	98	166	114	148	166	205	437	470	83	9	4
13	9	98	542	114	148	166	205	470	505	54	9	4
14	9	83	322	114	148	166	205	542	542	54	9	4
15	9	98	322	114	148	166	205	581	542	41	9	4
16	9	98	322	185	166	166	205	542	506	41	9	4
17	9	98	322	166	166	166	296	812	505	29	9	4
18	18	98	322	166	148	166	272	932	437	29	9	4
19	18	98	249	185	131	166	249	1,240	406	29	9	4
20	18	98	148	185	131	166	227	1,500	406	41	9	4
21	114	98	114	185	148	166	227	1,680	377	29	9	9
22	114	114	83	185	148	166	227	1,420	349	29	9	9
23	114	114	166	166	148	166	227	1,500	322	29	9	9
24	114	114	185	185	166	166	205	1,000	322	29	9	9
25	41	114	272	205	166	166	205	1,000	272	18	9	9
26	54	114	296	185	166	166	166	664	249	18	18	9
27	54	114	227	185	166	166	166	710	249	18	18	9
28	54	114	185	185	166	166	114	664	249	18	18	9
29	54	114	185	185	148	166	98	812	296	18	18	9
30	54	148	166	185	.....	166	185	932	349	18	18	9
31	68	.....	166	185	.....	166	.....	870	.....	18	18	.....

Monthly discharge of Carson River near Fort Churchill, Nev., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	225	44	143	8,790
November	200	99	151	8,980
December	225	136	183	11,300
January	296	114	183	11,300
February	932	148	253	14,100
March	437	166	250	15,400
April	1,500	406	762	45,300
May	3,140	1,150	1,810	111,000
June	2,260	54	465	27,700
July	54	9	22.8	1,400
August	9	4	7.9	484
September	2	2	2.0	119
The year	3,140	2	354	256,000
1919–20.				
October	114	2	31.9	1,960
November	148	54	93.5	5,560
December	542	83	215	13,200
January	205	114	159	9,780
February	185	131	162	9,320
March	249	148	176	10,800
April	296	98	190	11,300
May	1,680	227	709	43,600
June	932	249	499	29,700
July	759	18	149	9,160
August	18	9	10.7	658
September	9	4	6.8	406
The year	1,680	2	200	145,000

NOTE.—Monthly discharge computed by the U. S. Geol. Survey.

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MARKLEEVILLE CREEK[1] ABOVE MARKLEEVILLE, CALIF.

LOCATION.—At highway bridge above mouth of Pleasant Valley Creek, three-fourths mile above Markleeville, Alpine County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 7, 1911, to September 30, 1920 (fragmentary).

GAGE.—Vertical staff in two sections on left abutment of bridge; read by W. J. Clark; datum of gage was raised 5.71 feet August 18, 1914.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 2.85 feet May 1 (discharge, 292 second feet); minimum stage 0.8 foot July 27, 28, August 6 and 30 (discharge, 0.5 second-foot).

Maximum stage recorded during the year ending September 30, 1920, 3.00 feet May 18 and 20 (discharge, 345 second-feet); minimum stage recorded, 0.8 foot August 17 and 23 (discharge 0.5 second-foot).

1911–1920: Maximum stage recorded, 3.65 feet at 4.30 p. m. June 15, 1917 (discharge, 602 second-feet); minimum stage 0.7 foot September 19, 1916 (discharge, 0.1 second-foot).

ICE.—Stage-discharge relation affected by ice November 23, 1919.

DIVERSIONS.—Town ditch, which heads above the gage, furnished water for irrigation and domestic supply at Markleeville. A small ditch also diverts water for irrigation on Hot Springs ranch.

REGULATION.—No information.

ACCURACY.—Stage-discharge relation probably permanent. Rating curve well defined below 200 second-feet and extended above. Gage read to half-tenths occasionally. Daily discharge ascertained by applying gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Markleeville Creek above Markleeville, Calif., during the years ending Sept. 30, 1919 and 1920.

[Made by H. D. McGlashan.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1919.	*Feet.*	*Sec.-ft.*	1920.	*Feet.*	*Sec.-ft.*
June 26	1.42	16	July 28	1.00	2.2

[1] Locally known as Hot Springs Creek.

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Daily discharge, in second-feet, of Markleeville Creek above Markleeville, Calif., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.								
1		3.5		292				
2		3.5			105			
3					95			
4				230				1.0
5				260				
6				275			0.5	
7	2.5			260		4.5		
8	2.5			172				
9				200		3.5		
10					47			
11				172				
12				215				
13		3.1		185	31			
14		3.5		200				
15				185				1.0
16	.4	3.5		185		1.0		1.0
17				172				1.0
18				160	29			1.0
19		3.9	105					
20			125					
21			135			1.0		
22		3.5	148			1.0		
23			160					
24	2.5		172	215				
25		6.0	172		16			
26					15			
27				185	14	.5		
28			129	200		.5		
29			275	260				
30	3.5						.5	1.2
31	3.5			125				
1919-20.								
1	1.4	3.6		54				
2								
3	1.4			60				
4				60				
5								
6								
7					102			
8				130		14		
9								
10				102			.9	
11		6.0						
12								
13								
14								
15								
16								
17							.6	
18	2.8			275				
19								
20	2.8		36	275		2.8		
21		3.4		310				
22				215	60			
23		3.0	32				.5	
24		2.8						
25							.8	
26					32	1.8		
27	2.8		42				.8	.9
28			68			2.0	.7	.8
29			84				.7	
30			72				.7	.9
31								

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MARKLEEVILLE CREEK AT MARKLEEVILLE, CALIF.

LOCATION.—In SE. ¼ sec. 21, T. 10 N., R. 20 E., at highway bridge at Markleeville, Alpine County, three-quarters of a mile below junction with Pleasant Valley Creek.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 11, 1910, to September 30, 1920 (fragmentary).

GAGE.—Vertical staff on left abutment of highway bridge near downstream end; read by W. J. Clark.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; somewhat shifting during high water. Banks are high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 3.8 feet May 1 and 6 (discharge, 507 second-feet); minimum stage 0.7 foot August 30 and several days in September (discharge, 2.5 second-feet).

Maximum stage recorded during year ending September 30, 1920, 3.8 feet May 18, 20, 21 (discharge, 507 second-feet); minimum stage 0.65 foot September 6 (discharge 2.0 second-feet).

1910–1920: Maximum stage recorded 5.3 feet June 15, 1912 (discharge, 915 second-feet); minimum stage, 0.65 foot September 6, 1920 (discharge, 2.0 second-feet). Flood of March, 1907, reached a stage of about 9 feet.

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—See Markleeville Creek above Markleeville. Water is also diverted from Pleasant Valley Creek for irrigation.

REGULATION.—Diversions partly regulate flow. Some storage has been developed on Pleasant Valley Creek.

ACCURACY.—Stage-discharge relation considered permanent. Rating curve fairly well defined below 500 second-feet and extended above. Gage read to half-tenths occasionally, and twice daily on May 18, 20, and 21, 1920. Daily discharge ascertained by applying mean daily gage height to rating table.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Markleeville Creek at Markleeville, Calif., during the years ending Sept. 30, 1919 and 1920.

[Made by H. D. McGlashan.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1919.	*Feet.*	*Sec.-ft.*	1920.	*Feet.*	*Sec.-ft.*
June 27	1.58	34	July 27	0.79	4.3

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Daily discharge, in second-feet, of Markleeville Creek at Markleeville, Calif., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.								
1		7		507				
2		7			186			
3					197	22		
4				464				2.5
5								
6				507				
7	15			464		17		
8	13			387		22		
9						22		
10								
11								
12					84	23		
13		7		387	73			
14		28						
15				387	68			2.5
16	17	11		387		22		
17				336				
18				320	73			2.5
19		13						
20								2.5
21			292					2.5
22		13	265		58			2.5
23	10		306					
24	12	13	320	424				2.5
25			202		43			
26				352				
27					32			2.5
28	12			486		20		
29			444			20		3.0
30	7						2.5	4.2
31	11							
1919–20.								
1		10		133				
2	5							
3	5			133				
4				150				3.5
5							3.0	
6								2.0
7				265	218			
8						35		
9					186			
10				208			20	
11		10		176				2.5
12							22	2.5
13					141			
14								
15							48	
16								
17							25	
18	8.5			464			28	
19	8.5							
20	8.5		63	464	96			
21	8.5	10		464	96	15		
22	8.5			387				
23	8.5	9	63				2.5	
24	8.5	10		387				
25	8.5						3.0	
26	8.5				73	3.0		
27	8.5		84	292		3.8	2.6	5.0
28			133			4.2	3.0	5.0
29			167				2.5	4.2
30			158				2.5	4.2
31							2.5	

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WEST FORK OF CARSON RIVER AT WOODFORDS, CALIF.

LOCATION.—In SE. ¼ sec. 34, T. 11 N., R. 19 E., at highway bridge at Woodfords, Alpine County.

DRAINAGE AREA.—70 square miles (measured on topographic map).

RECORDS AVAILABLE.—April, 1890, to March, 1892; October 18, 1900, to September 30, 1915; April 12, 1916, to September 30, 1920.

GAGE.—Vertical staff on right bank just above highway bridge, installed at independent datum August 21, 1914; read by Mrs. M. Merrill.

DISCHARGE MEASUREMENTS.—Made from cable half a mile above gage or by wading.

CHANNEL AND CONTROL.—Fine gravel and boulders; section rough but fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 4.8 feet April 29 and 30 (discharge, 958 second-feet); river dry September 13–19.

Maximum stage recorded during year ending September 30, 1920, 4.2 feet on May 12 (discharge, 742 second-feet); water below lowest graduation on gage July 21 to September 30 (discharge less than 5 second-feet during most of this period).

1900–1920: Maximum stage recorded, 6.8 feet May 9 and 10, 1906 (discharge, 1,570 second-feet); river dry September 13–19, 1919.

ICE.—Stage-discharge relation affected by ice during winter.

DIVERSIONS.—Three irrigation canals divert on right bank between cable and gage. The water is used mainly for irrigation in California. Their flow is not included in record.

REGULATION.—Flow partly regulated by diversions.

ACCURACY.—Stage-discharge relation changed slightly in April, July, September, and December, 1919; affected by ice December 16, 1918, to January 25, 1919, and during winter of 1919–20. Rating curves fairly well defined. Gage read to half-tenths 3 to 5 times a week. Daily discharge ascertained by applying daily gage height to rating table. Discharge interpolated for days when gage was not read, and for periods of ice effect, giving full weight to discharge measurements on January 5, 1919, and January 13, 1920. Discharge estimated because of doubtful gage-height record May 8-11, June 29 to July 2, and July 12–20, 1920. Discharge estimated because water was below gage July 21 to September 30, 1920. Records fair.

Discharge measurements of West Fork of Carson River at Woodfords, Calif., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 8	J. W. Bones	[a] 1.35	21.1	Jan. 13	J. W. Bones	[a] 1.15	22.4
Apr. 12	do	2.21	142	May 27	R. R. Rowe	2.55	[d] 281
May 30	A. B. Purton	2.85	[b] 274	July 3	do	1.75	[d] 91
Aug. 9	J. W. Bones	.69	[c] 3.9				
Oct. 14	do	1.20	16.8				

[a] Stage-discharge relation affected by ice.
[b] Discharge in canals, 27.3 second-feet.
[c] Discharge in canals, 11.6 second-feet.
[d] Discharge includes flow of 3 canals that divert above gage; diversions not measured.

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Daily discharge, in second-feet, of West Fork of Carson River at Woodfords, Calif., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	23	14	23		29	29	77	850	258	23	23	18
2	23	14	26	21	29	36	100	850	258	23	23	14
3	18	14	29		29	36	125	850	258	20	18	10
4	14	14	29		29	36	150	778	233	18	14	10
5	14	14	29	21	29	32	175	707	233	18	10	10
6	14	14	29		29	29	233	637	186	14	7	7
7	14	16	29		36	29	284	620	186	10	6	0
8	14	18	29		44	29	258	602	144	7	5	0
9	14	16	29		44	36	234	568	144	7	4	2
10	14	14	29		40	32	209	500	125	10	4	2
11	14	14	29		36	29	164	500	116	10	7	2
12	14	14	29		36	29	142	500	108	7	10	1
13	14	18	29		36	29	186	500	108	7	10	0
14	12	23	29		36	29	210	467	108	7	10	0
15	10	23	29	25	32	29	233	467	92	7	12	0
16	10	23			29	29	233	467	84	7	14	0
17	10	23			29	29	258	467	77	7	14	0
18	10	20			29	29	258	467	77	10	10	0
19	10	18			29	29	341	467	70	10	8	0
20	10	18			29	29	402	467	64	10	7	8
21	10	18			29	29	534	467	64	7	6	8
22	10	18			29	29	672	467	64	7	4	8
23	10	18	25		29	29	672	467	29	7	3	8
24	10	18			29	29	690	467	26	4	2	8
25	10	18			29	29	707	434	23	4	6	8
26	12	18		29	29	32	742	434	23	4	10	9
27	14	18		29	29	36	778	434	23	7	16	12
28	14	20		29	29	44	886	467	18	15	23	16
29	14	23		29	.....	53	958	467	23	23	23	11
30	14	23		29	.....	64	958	274	23	23	23	6
31	14	.....		29	.....	64	.....	258	.....	23	20	.....
1919-20.												
1	6	21			23	29	23	371	341	72		
2	6	21			23	36	23	371	341	71		
3	6	21			23	32	23	371	341	70		
4	6	21			23	29	23	371	341	108		
5	6	21			23	29	23	341	341	108		
6	8	21		22	23	29	23	341	341	108		
7	9	21			23	29	18	341	356	108		
8	9	24			23	29	14		371	108		
9	9	28	25		23	29	14		371	108		
10	10	28			23	29	14	500	371	108		
11	12	28			23	29	23		371	108		
12	12	28			23	29	26	742	371	53		
13	14	28		22	23	29	29	672	341	36		
14	16	28			23	29	36	603	312	29		
15	16	32			23	29	36	534	284	29	5	5
16	16	37			23	29	44	341	258	23		
17	16	37	21		23	29	44	284	233	23		
18	16	37	21		23	29	36	284	233	23		
19	16	37	21	22	23	29	36	233	186	20		
20	16	37			23	29	36	233	164	18		
21	18	37			23	29	36	233	136			
22	21	37			23	29	36	233	108			
23	21	37			23	29	44	233	92			
24	21	37			23	29	64	258	77			
25	21	37	21	23	23	29	77	258	77			
26	21	37		23	23	26	125	258	77	10		
27	21	37		23	23	23	186	258	77			
28	21	37		23	23	23	284	258	76			
29	21	37		23	29	23	371	258	75			
30	21	37		23	.....	23	371	341	74			
31	21	.....		23	.....	23	.....	341	.....			.....

NOTE.—Braced figures show mean discharge for periods indicated.

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Observer reported as follows on operation of canals diverting above gage:

1919.

June 9. Canals carrying water.
22. Canals dry.
23–28. Canals carrying water.
July 7. Canals carrying water.
14. Canals dry.
21–25. Canals carrying water.
July 28 to Aug. 2. Canals dry.
Aug. 4. Canals carrying water.
11. Canals dry.
18. Canals carrying water.
25. Canals dry.
Sept. 1. Canals carrying water.
8. Canals dry.
15. Canals carrying water.
22. Canals dry.
29. Canals carrying water.
Oct. 1. Canals carrying water.

1920.

Apr. 1. One canal carrying water.
6. One canal carrying water.
8. Two canals carrying water.
11. One canal carrying water.
15. Canals dry.
May 2. Three canals carrying water.
9–11. Three canals carrying water.
16. Three canals carrying water.
30. Three canals still carrying water.
June 6. Three canals still carrying water.
7. Canals dry.
13. Canals carrying water.
27. Canals carrying water.
July 1. Canals carrying water.
5. Canals dry.
14–17. Canals carrying water.

Monthly discharge of West Fork of Carson River at Woodfords, Calif., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	23	10	13.2	812
November	23	14	17.8	1,060
December	29	.....	26.6	1,640
January	.....	.....	25.1	1,540
February	44	29	31.8	1,770
March	64	29	33.9	2,080
April	958	77	396	23,600
May	850	258	528	32,500
June	258	18	108	6,430
July	23	4	11.5	707
August	23	2	11.4	701
September	18	0	5.9	353
The year	958	0	101.	73,200
1919–20.				
October	21	6	14.6	898
November	37	21	30.9	1,840
December	.....	.....	23.1	1,420
January	23	.....	22.2	1,360
February	29	23	23.2	1,330
March	36	23	28.3	1,740
April	371	14	71.3	4,240
May	742	233	367	22,600
June	371	74	238	14,200
July	108	.....	46.5	2,860
August	.....	.....	5.0	307
September	.....	.....	5.0	298
The year	742	.....	73.0	53,100

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HUMBOLDT RIVER BASIN.

HUMBOLDT RIVER AT PALISADE, NEV.

LOCATION.—In sec. 36, T. 32 N., R. 51 E., at highway bridge at Palisade, Eureka County, 100 feet below Southern Pacific Railroad bridge, and 1 mile above mouth of Pine Creek.

DRAINAGE AREA.—5,010 square miles (measured on Land Office maps).

RECORDS AVAILABLE.—November 27, 1902, to October 19, 1906; July 26, 1911, to September 30, 1920.

GAGE.—Chain gage at highway bridge since December 1, 1911; read by Albina Siri.

DISCHARGE MEASUREMENTS.—Made from cable about an eighth of a mile above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel. Control at low stages is a gravel bar 50 to 75 feet below gage; at high stages a pile bent railroad bridge about 300 feet below gage and a rock riffle a few hundred feet farther downstream become effective; both fairly permanent. One channel at all stages. Point of zero flow, about gage height, 0.4 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 5.45 feet on March 28 (discharge, 1,440 second-feet); minimum stage, 0.86 foot August 25 to September 18 (discharge, 9 second-feet).

Maximum stage recorded during year ending September 30, 1920, 4.10 feet May 28–31 (discharge, 803 second-feet); minimum stage, 0.99 foot on September 19 (discharge, by current-meter measurement, 13.3 second-feet).

1903–1906, 1911–1920: Maximum stage recorded, 7.4 feet at 2.40 p. m. May 30, 1917 (discharge, 3,170 second-feet); minimum stage, 0.86 foot, August 25 to September 18, 1919 (discharge, 9 second-feet).

ICE.—Stage-discharge relation affected by ice during most winters.

DIVERSIONS.—Some water diverted for irrigation in valley above canyon.

REGULATION.—Flow affected by irrigation diversions above.

ACCURACY.—Stage-discharge relation changed March 2, 1920; affected by ice November 26 to December 6, 1918, December 9, 1918, to January 20, 1919, and November 25, 1919, to January 18, 1920. Rating curves well defined below 1,300 second-feet; extended above. Gage read to hundredths once a day, except when there was ice under gage. Daily discharge ascertained by applying daily gage height to rating table except for periods of ice effect, for which it was estimated from current-meter measurements, weather records, and observer's notes. Records good.

Discharge measurements of Humboldt River at Palisade, Nev., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Dec. 15	J. W. Bones	[a] 1.62	61	Jan. 5	J. W. Bones	[a] 1.38	29.6
1919.				23	do	1.54	57
Apr. 2	do	4.95	1,210	May 10	Rowe and Purton	3.28	473
Aug. 1	do	.95	13.5	July 7	R. R. Rowe	2.28	144
				Sept. 19	do	.99	13.3

[a] Stage-discharge relation slightly affected by ice.

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Daily discharge, in second-feet, of Humboldt River at Palisade, Nev., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	30	46			92	136	1,230	910	712	39	13	9
2	32	46			95	144	1,210	880	696	38	12	9
3	33	48			95	161	1,170	872	671	36	12	9
4	35	49	60		98	230	1,160	864	653	33	12	9
5	36	49			98	230	1,150	864	627	32	12	9
6	36	51			104	230	1,100	864	619	30	12	9
7	38	51	66		114	230	1,050	864	611	30	12	9
8	38	55	66		121	230	1,020	840	515	29	12	9
9	39	55			132	201	970	832	441	28	11	9
10	39	57		50	136	185	920	816	341	26	11	9
11	41	57	60		140	180	864	800	321	22	11	9
12	42	57			153	180	840	720	230	22	11	9
13	42	55			166	201	832	688	190	21	11	9
14	44	55			157	201	816	680	140	20	11	9
15	44	55	61		157	190	808	662	118	18	11	9
16	46	53			153	190	808	619	104	16	11	9
17	46	53			153	374	792	603	92	16	11	9
18	48	53			153	744	784	663	86	16	11	9
19	48	57			148	962	776	595	86	16	11	12
20	49	60			148	1,160	760	595	84	16	11	12
21	49	62		57	144	1,420	760	587	81	16	11	12
22	49	62		57	144	1,090	760	587	76	15	10	12
23	49	62		64	144	1,010	760	611	71	15	10	13
24	49	69	55	76	136	1,020	832	627	64	15	10	13
25	49	69		98	132	1,160	848	627	62	15	9	13
26	49			98	132	1,350	864	635	51	14	9	13
27	48			98	129	1,410	864	644	48	14	9	13
28	48	60		95	129	1,440	880	662	44	12	9	14
29	48			95	.....	1,340	890	736	42	10	9	14
30	48			95	.....	1,280	920	736	41	9	9	14
31	46	.....		95	.....	1,240	.....	720	.....	9	9	.....
1919–20.												
1	15	26			92	118	184	427	795	276	23	15
2	15	26		28	95	148	184	427	786	257	22	14
3	15	26			98	163	184	427	786	231	21	14
4	16	26			98	163	184	427	778	207	21	14
5	16	28		30	101	163	184	419	753	190	21	14
6	16	28			104	163	201	419	745	168	20	14
7	16	28			104	168	213	419	736	148	20	14
8	17	28	20		104	168	231	419	712	139	20	14
9	17	28			104	168	244	442	728	135	20	14
10	17	28			107	168	296	480	736	126	20	14
11	17	28			107	163	310	527	745	123	19	14
12	18	28		33	107	163	331	535	753	115	18	14
13	18	28			107	163	338	542	753	108	18	14
14	18	28			107	158	353	550	761	96	17	14
15	18	28			107	158	360	558	761	78	17	14
16	20	26			107	158	360	558	778	68	16	14
17	20	26			107	158	367	558	778	66	16	14
18	20	25			107	153	389	558	761	62	15	14
19	20	25		44	111	153	404	598	753	54	15	14
20	20	25		46	111	153	412	630	630	53	15	16
21	20	23		49	111	153	434	671	643	49	15	16
22	21	23		51	111	163	450	728	643	46	15	17
23	21	23	28	57	111	163	457	761	638	44	15	17
24	22	23		60	111	163	465	778	582	41	15	17
25	22			64	114	168	465	786	550	37	15	18
26	23			66	114	173	465	795	511	34	15	18
27	23	22		71	114	173	457	795	480	33	15	20
28	23			76	114	179	450	803	419	30	15	20
29	25			79	118	184	442	803	367	29	15	20
30	25			84	.....	184	434	803	296	27	15	19
31	26	.....		89	.....	184	.....	803	.....	25	15	.....

NOTE.—Braced figures show mean discharge for periods indicated.

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Monthly discharge of Humboldt River at Palisade, Nev., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	49	30	43.2	2,660
November	69	46	56.2	3,340
December	.....	.....	57.8	3,550
January	98	.....	62.2	3,820
February	166	92	132	7,330
March	1,440	136	649	39,900
April	1,230	760	915	54,400
May	910	587	721	44,300
June	712	41	264	15,700
July	39	9	20.9	1,290
August	13	9	10.7	658
September	14	9	10.6	631
The year	1,440	9	245	178,000
1919-20.				
October	26	15	19.4	1,190
November	28	.....	25.4	1,510
December	.....	.....	24.1	1,480
January	89	.....	45.4	2,790
February	118	92	107	6,160
March	184	118	163	10,000
April	465	184	341	20,300
May	803	419	595	36,600
June	795	296	673	40,000
July	276	25	99.8	6,140
August	23	15	17.4	1,070
September	20	14	15.5	922
The year	803	14	177	128,000

HUMBOLDT RIVER AT COMUS, NEV.

LOCATION.—In NW. ¼ sec. 14, T. 36 N., R. 41 E., at Comus, Humboldt County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 25, 1917, to September 30, 1920.

GAGE.—Inclined staff on left bank 160 feet above Southern Pacific section house, established September 25, 1917; read by Patrick Evers and John Alvaro.

DISCHARGE MEASUREMENTS.—Made from cable or by wading near gage.

CHANNEL AND CONTROL.—Channel is about 125 feet wide and 8 feet deep and is straight for half a mile above and below gage. Stream flows through a flat meadow and is sluggish. Stream bed is composed of fine gravel and sand. Low-water control is gravel bar 150 feet downstream.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 6.8 feet April 10-12 (discharge, 1,250 second-feet); flow probably zero from December 20 to January 6.

Maximum stage recorded during year ending September 30, 1920, 3.00 feet on June 22 (discharge, 234 second-feet); no flow August 18 to September 30.

ICE.—Stage-discharge relation affected by ice in winter.

DIVERSIONS.—Water is diverted all along the river both above and below this station. Practically all flow during irrigation season is seepage.

REGULATION.—None except by diversion.

ACCURACY.—Stage-discharge relation changed during winter of 1919-20; affected by ice December 22, 1918, to February 19, 1919, and December 12, 1919, to February 15, 1920. Rating curve used until December, 1919, well defined below 700 second-feet and fairly well defined above; curve used February to August, 1920,

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fairly well defined. Gage read to quarter-tenths once daily except December 22, 1918, to February 19, 1919, when readings were discontinued because of ice, and August 31 to September 30, 1919, when there was no observer. Daily discharge ascertained by applying daily gage height to rating table. For periods of ice effect, mean flow for short periods was estimated from discharge measurements and study of temperature records. For August 31 to September 30, 1919, estimate of flow was based on discharge measurements made August 6 and October 22, 1919.

Discharge measurements of Humboldt River at Comus, Nev., during the years ending September 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 18	J. W. Bones	1.9	[a] 11.7	Jan. 7	J. W. Bones	[a] 1.52	2.1
May 3	do	4.82	633	May 22	R. R. Rowe	1.62	10.0
Aug. 6	do	1.25	.9	July 5	do	2.57	146
Oct. 22	do	1.25	.6				
Nov. 12	do	1.30	.8				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Humboldt River at Comus, Nev., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	1	2	6			88	870	612	190	24	1	
2	1	2	6			88	901	520	190	20	1	
3	1	2	6			84	916	6[illegible]7	190	12	1	
4	2	2	6	0		80	901	61[illegible]	212	10	1	
5	4	2	6			80	948	598	223	10	1	
6	2	2	8			95	994	584	223	9	1	
7	2	2	8			129	1,120	560	168	9	1	
8	2	2	10			148	1,140	540	138	9	1	
9	2	2	10			148	1,090	512	95	5	1	
10	2	2	8			148	1,250	484	80	5	1	
				1	35							
11	2	2	6			148	1,250	498	54	5	1	
12	1	2	5			148	1,250	404	33	5	1	
13	1	2	4			148	1,220	328	24	5	1	
14	1	2	3			148	1,200	285	20	4	1	
15	1	2	2			148	1,150	268	17	4	1	
				8								1
16	1	2	2			168	1,080	246	17	4	1	
17	1	2	1			168	1,030	212	17	4	1	
18	1	2	1	12		168	963	201	17	3	1	
19	1	2	1			168	886	190	17	3	1	
20	1	2	0		54	168	824	179	17	3	1	
21	2	2	0		54	168	824	168	17	3	1	
22	2	2			54	212	824	158	17	2	1	
23	2	2			60	292	808	148	17	2	1	
24	2	4			60	404	777	148	17	2	1	
25	2	5		14	66	512	824	138	18	2	1	
26	2	6	0		66	612	824	129	19	2	1	
27	2	6			88	627	808	120	20	2	1	
28	2	6			88	663	792	111	21	2	1	
29	2	6			.....	687	717	190	22	2	1	
30	2	6			.....	717	687	212	23	2	1	
31	2	.....			.....	732	.....	190	.....	1	1	.....

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Daily discharge, in second-feet, of Humboldt River at Comus, Nev., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	1	1	1			63	142	79	48	152	24	
2	1	1	1			63	133	63	66	114	30	
3	1	1	1			63	133	63	56	88	35	
4	1	1	1	2		63	133	48	56	114	24	
5	1	1	1			63	133	35	42	149	9	
6	1	1	1			63	133	24	60	133	9	
7	1	1	1	2		114	133	24	96	105	5	
8	1	1	1		35	133	88	24	100	96	5	
9	1	1	1			133	48	24	96	96	2	
10	1	1	1			133	15	20	71	96	2	
11	1	1	1			133	15	20	60	96	1	
12	1	1				133	15	20	30	96	1	
13	1	1				133	15	15	35	96	1	
14	1	1				133	9	15	56	114	1	
15	1	1		2		133	9	15	63	114	1	0
16	1	1	1		48	133	9	15	56	114	1	
17	1	1			48	133	9	15	56	114	1	
18	1	1			48	133	9	15	56	88		
19	1	1			48	133	9	15	71	79		
20	1	1			48	133	9	12	133	71		
21	1	1			48	114	15	12	182	71		
22	1	1			48	96	30	11	284	71		
23	1	1			48	114	35	12	192	71		
24	1	1			48	114	35	20	172	71	0	
25	1	1			48	114	71	33	172	35		
26	1	1	2		56	114	86	42	162	35		
27	1	1		8	56	114	71	42	162	35		
28	1	1			56	152	63	42	162	35		
29	1	1			63	152	63	42	142	30		
30	1	1			.....	152	63	35	142	24		
31	1	.....			.....	142	.....	35	.....	24		.....

NOTE.—Braced figures show mean discharge for periods indicated.

Monthly discharge of Humboldt River at Comus, Nev., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	4	1	1.7	103
November	6	2	2.8	168
December	10	0	3.2	196
January	.....	.....	7.3	448
February	88	.....	44.8	2,490
March	732	80	268	16,500
April	1,250	687	962	57,200
May	627	111	332	20,400
June	223	17	71.1	4,230
July	24	1	5.6	347
August	1	1	1.0	61
September	.....	.....	1.0	60
The year	1,250	0	141	102,000
1919-20.				
October	1	1	1.0	61
November	1	1	1.0	60
December	.....	.....	1.4	83
January	.....	.....	3.6	218
February	63	.....	42.6	2,450
March	152	63	116	7,130
April	142	9	57.8	3,440
May	79	11	28.6	1,760
June	234	30	101	6,010
July	152	24	84.7	5,210
August	35	0	4.9	301
September	0	0	0	0
The year	234	0	36.8	26,700

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HUMBOLDT RIVER NEAR OREANA, NEV.

LOCATION.—In sec. 35, T. 29 N., R. 32 E., 2 miles above highway bridge near J. J. McCarthy's ranch and 2 miles southwest of Oreana, Pershing County.

DRAINAGE AREA.—13,800 square miles (measured on map issued by General Land Office).

RECORDS AVAILABLE.—January 27, 1896, to December 31, 1909; September 7, 1910, to September 30, 1920.

GAGE.—Friez water-stage recorder on right bank since October 4, 1914; inspected by C. E. Saunders. Also inside hook and outside inclined staff gages.

DISCHARGE MEASUREMENTS.—Made from cable 20 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of sand. Principal control not well defined but is probably about half a mile below gage, where bed is composed of firm clay; fairly permanent. Low-water control is about 50 feet below gage. Right bank high and comparatively clean. Left bank not subject to overflow, but subject to caving.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 5.65 feet at 5 a. m. May 29 (discharge, 1,280 second-feet); minimum discharge, no flow January 1–16, and August 11 to September 29.

Maximum stage during year ending September 30, 1920, from water-stage recorder, 2.00 feet at 4 p. m. August 26 (discharge, 185 second-feet); river dry several times during the year.

1896–1920: Maximum stage recorded, 12.0 feet May 12, 1897 (discharge, 3,050 second-feet); minimum discharge, no flow in June and July, 1905, in August and September, 1915, in September, 1918, in January, August, September, and December, 1919, and in January, May, June, July, August, and September, 1920.

ICE.—Stage-discharge relation seriously affected by ice every winter.

DIVERSIONS.—Station is above all diversions for the Lovelock district, but considerable water is diverted above the station for direct irrigation and storage.

REGULATION.—Flow is affected by water stored and released by the Humboldt-Lovelock Irrigation, Light & Power Co. at its reservoirs a few miles up the river, near Humboldt.

ACCURACY.—Stage-discharge relation for low stages changed slightly during high water on May 29, 1919, and on May 19, 1920; affected by ice November 27, 1918, to January 24, 1919, and December 1, 1919, to February 6, 1920. Rating curves well defined. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating tables the daily mean gage height determined from recorder graph. Discharge for periods of ice effect estimated from current-meter measurements, temperature records, and notes on the condition of the stream. Records good.

Discharge measurements of Humboldt River near Oreana, Nev., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
1918. Dec. 17	J. W. Bones	[a] 0.82	7.0	1919. Oct. 19	J. W. Bones	0.64	14.7
1919. Jan. 16	do		0	1920. Jan. 10	J. W. Bones		[b] 0
Apr. 9	do	2.51	291	May 23	R. R. Rowe	.70	11.6
				July 4	do		0

[a] Stage-discharge relation affected by ice.

[b] Channel frozen solid.

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Daily discharge, in second-feet, of Humboldt River near Oreana, Nev., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	42	19			46	6	240	423	106	80	14	
2	25	20			40	6	265	372	92	89	13	
3	35	20	10		37	6	196	372	82	90	11	
4	42	20			27	5	148	379	78	92	10	
5	29	20			26	5	170	372	75	90	9	
6	19	20			25	33	152	369	71	88	8	
7	12	20			20	76	160	381	68	82	8	
8	7	19		0	15	85	225	318	65	75	7	
9	6	18			11	75	291	212	63	68	6	
10		18			8	72	317	162	60	61	5	
11	5	17	8		12	63	344	166	55	54	4	
12		18			12	69	370	189	57	48	2	
13		19			9	66	397	212	62	36	1	
14		19			7	79	423	236	62	33	0	
15	39	19			7	88	472	238	65	31		0
16	105	19		0	7	94	537	238	68	33		
17	56	19	7		7	127	559	265	71	56		
18	35	20			7	152	548	357	74	57		
19	27	20			7	150	551	355	74	48		
20	24	20			7	141	585	305	75	43		
21	21	18		45	6	139	534	244	75	37		
22	19	15			6	132	485	191	79	31	0	
23	17	12			6	123	444	164	86	29		
24	16	14	4		6	127	502	144	86	25		
25	15	13		55	6	130	494	120	81	24		
26	15	12		53	6	134	420	100	82	22		
27	16			49	7	134	467	90	75	21		
28	16	11		49	7	135	459	79	63	19		
29	17			49	.....	141	507	550	60	19		
30	17			49	.....	130	467	150	70	17		39
31	18	.....		47	.....	148	.....	126	.....	16		.....
1919–20.												
1	27	18				19	13	1	1			2
2	21	18				29	13	1				1
3	16	17				36	13	1				1
4	13	16			14	29	13	1				
5	13	16				23	12					
6	18	16				20	12					
7	18	16			12	19	12	0				
8	17	15	2	0	11	17	11					
9	16	13			11	15	10					
10	16	11			12	14	9					
11	15	10			11	14	8	10				
12	15	9			11	13	7	17				
13	15	9			11	13	6	14			0	
14	15	8			10	12	6	21				
15	15	8			10	12	5	88				
16	15	7			10	13	8	103	0	0		0
17	15	7			9	13	11	112				
18	15	7			8	13	11	120				
19	15	7			7	12	11	119				
20	15	7			6	12	9	120				
21	14	7			5	13	7	86				
22	14	8			5	16	6	27				
23	15	8	0	10	5	19	5	14				
24	15	8			6	17	4	8				
25	14	8			8	15	3	6			4	
26	15	7			8	13	3	4			102	
27	15	7			7	13	2	2			94	
28	16	4			15	13	2	2			17	
29	17	3			18	13	2	1			6	
30	17	3			.....	13	1	1			3	
31	17	.....			.....	13	.....	1	.....		2	.....

NOTE.—Discharge estimated Oct. 10–14, 1918, and interpolated Apr. 8, 10–13, May 12, 13, June 15–17, June 30 to July 1, July 9–11, July 31 to Aug. 3, and Aug. 11–13, 1919, because of no gage-height record.

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Monthly discharge of Humboldt River near Oreana, Nev., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	105	.....	23.1	1,420
November	20	.....	17.1	1,020
December	.....	.....	6.5	398
January	.....	0	22.9	1,410
February	46	6	13.8	766
March	152	5	92.6	5,690
April	585	148	391	23,300
May	550	79	254	15,600
June	106	55	72.7	4,330
July	92	16	48.8	3,000
August	14	0	2.2	194
September	39	0	1.3	77
The year	585	0	79.0	57,200
1919-20.				
October	27	13	15.9	978
November	18	3	9.9	591
December	.....	0	1.0	60
January	.....	0	5.2	317
February	18	5	10.3	592
March	36	12	16.3	1,000
April	13	1	7.8	466
May	120	0	28.4	1,750
June	1	0	.03	2
July	0	0	0	0
August	102	0	7.4	452
September	2	0	.1	6
The year	120	0	8.57	6,220

HUMBOLDT RIVER NEAR LOVELOCK, NEV.

LOCATION.—In NW. ¼ sec. 11, T. 25 N. R. 31 E., 1,500 feet below dam and reservoir on Big 5 ranch, lowest diversion for irrigation on Humboldt River, and 9 miles south of Lovelock, Pershing County.

DRAINAGE AREA.—14,200 square miles (measured on maps issued by General Land Office).

RECORDS AVAILABLE.—February 7, 1912, to September 30, 1920.

GAGE.—Lietz water-stage recorder on left bank since June 26, 1914; inspected by C. E. Sommer.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Bed is composed of firm clay. Control fairly permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—No flow during years ending September 30, 1919, and 1920. 1912-1920: Maximum stage recorded, 5.15 feet May 4, 1914 (discharge, 1,450 second-feet); minimum stage, stream dry for periods in 1913, 1916, 1917, and 1918, and throughout the years ending September 30, 1919, and 1920.

ICE.—Practically none.

DIVERSIONS.—Below all irrigation diversions.

REGULATION.—Flow affected by irrigation diversions and storage.

ACCURACY.—River dry throughout both years. Observer lives in sight of the river, and his weekly reports show that there was no flow during current years. Station visited by engineers of the United States Geological Survey on the following days when river was found to be dry: October 19, 1919, January 9, May 24, and July 4, 1920.

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STARR CREEK NEAR DEETH, NEV.

LOCATION.—In NE. ¼ sec. 12, T. 36 N., R. 59 E., at highway bridge 2 miles above mouth, and 3 miles southeast of Deeth, Elko County; below all large tributaries except Boulder Creek.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 4, 1913, to September 30, 1920.

GAGE.—Vertical enamel staff nailed to upstream pile of bridge bent near right bank; read by G. E. Weathers. Datum of gage raised 1.0 foot August 23, 1916, and 1.14 feet on November 6, 1917.

DSCIHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed composed of small gravel. Control is gravel bar; shifts occasionally. One channel except at extremely high stages, when part of the flow passes under an auxiliary bridge.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 3.00 feet March 23 (discharge, 184 second-feet); minimum stage, 0.80 foot July 8 to August 7 (discharge, 0.5 second-foot).

Maximum stage recorded during year ending September 30, 1920, 3.2 feet on June 9 (discharge, 167 second-feet); minimum discharge, 1 second-foot August 17–22.

1913–1920: Maximum stage recorded, 4.8 feet June 27, 1917 (discharge, 383 second-feet); minimum stage 0.80 foot July 8 to August 7, 1919 (discharge, 0.5 second-foot).

ICE.—Stage-discharge relation generally affected by ice in winter.

DIVERSIONS.—Station is below practically all diversions from Starr Creek.

REGULATION.—Some variation in daily flow at times caused by diversions for irrigation.

ACCURACY.—Stage-discharge relation changed June 26 to July 7, 1920, by moss growing on control; affected by ice December 23, 1918, to January 17, 1919, November 27 to December 4, December 8–24, 1919, December 29, 1919, to January 2, 1920, and January 5–13, 1920. Rating curves fairly well defined below 60 second-feet and extended above. Gage read to half-tenths about four times a week. Daily discharge ascertained by applying gage height to rating table for days when gage was read, and interpolating discharge for days when gage was not read. Discharge during ice periods estimated from current-meter measurements, weather records, and observer's notes. Records fair.

Discharge measurements of Starr Creek near Deeth, Nev., during the years ending September 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Dec. 13	J. W. Bones	1.22	7.4	Jan. 1	J. W. Bones	[b] 1.71	7.7
				May 1	R. R. Rowe	1.76	24.2
1919.				2	Purton and Rowe	1.66	21.2
Apr. 30	do	1.87	36.7	July 9	R. R. Rowe	1.82	15.9
July 24	do	.82	[a] .4	Sept. 16	do	1.36	3.6
Oct. 24	do	1.11	4.0				

[a] Discharge estimated. [b] Stage-discharge relation affected by ice.

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Daily discharge, in second-feet, of Starr Creek near Deeth, Nev., for the years ending September 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	5	6	6		6	6	32	36	56	4	0.5	2
2	5	6	6		5	6	30	35	48	4	.5	2
3	5	6	6		5	6	28	39	40	4	.5	2
4	5	7	6		5	6	26	39	32	4	.5	2
5	5	7	6		5	6	24	40	29	4	.5	2
6	6	7	6		5	6	21	42	26	4	.5	2
7	6	7	6		5	6	18	43	24	4	.5	2
8	6	6	7		6	6	16	43	21	.5	1.0	2
9	5	6	7	3	6	6	16	43	18	.5	2.0	2
10	5	6	6		6	6	18	43	12	.5	2.0	2
11	5	6	6		6	6	20	43	6	.5	2.0	2
12	6	6	6		7	6	21	44	6	.5	1.5	2
13	6	6	6		8	6	24	46	6	.5	1.5	2
14	6	6	6		8	6	25	47	6	.5	1.5	2
15	6	7	6		8	6	24	48	6	.5	1.5	2
16	6	7	6		8	6	24	48	5	.5	1.5	2
17	6	6	6		7	6	24	49	5	.5	1.5	2
18	9	6	6	4	6	6	24	61	5	.5	1.5	2
19	8	6	6	4	6	8	25	73	4	.5	1.5	2
20	8	7	6	5	6	11	26	73	4	.5	1.5	2
21	6	7	6	6	6	14	25	81	4	.5	1.5	2
22	6	7	6	6	6	119	25	89	2	.5	1.5	2
23	6	7		7	6	184	26	97	2	.5	1.5	2
24	6	7		6	6	123	26	105	2	.5	1.5	2
25	6	7		6	6	62	26	105	2	.5	1.5	3
26	6	7		6	6		26	108	3	.5	1.5	3
27	6	7	4	6	6	49	26	112	4	.5	2.0	3
28	6	6		7	6		28	112	4	.5	2.0	3
29	6	6		8	.....		32	106	4	.5	2.0	3
30	6	6		8	.....	36	37	100	4	.5	2.0	3
31	6	.....		8	.....	34	.....	95	.....	.5	2.0	.....
1919–20.												
1	4	4		8	9	7	10	25	109	20	3	4
2	4	4		8	10	6	10	20	110	27	3	4
3	4	6	5	7	8	6	10	20	112	24	3	4
4	4	6		6	9	6	10	20	114	23	3	4
5	4	5	5		9	7	9	22	115	22	3	4
6	4	5	6		10	7	8	25	124	20	3	4
7	4	4	6		9	8	18	28	134	17	3	4
8	4	4			8	8	22	30	150	15	2	4
9	4	4		5	8	8	26	30	167	16	2	4
10	4	4			7	8	30	31	162	10	2	4
11	4	4			7	8	30	32	158	8	2	4
12	4	4			6	8	30	33	153	7	2	4
13	4	4			6	8	31	34	140	7	2	4
14	4	4		6	7	8	31	35	136	7	2	4
15	4	4		6	7	8	32	46	131	7	2	4
16	4	4	5	6	8	8	35	58	127	7	2	4
17	4	4		8	8	8	34	62	121	7	1	4
18	4	4		10	8	8	32	67	115	7	1	4
19	4	4		7	8	8	30	71	112	7	1	4
20	4	4		7	7	8	29	76	109	7	1	4
21	4	4		8	6	8	28	84	101	7	1	4
22	4	4		8	6	9	27	90	92	7	1	4
23	4	4		8	6	10	28	98	84	7	2	5
24	4	4		9	7	10	30	100	76	7	4	5
25	4	4	6	10	7	11	27	101	71	7	4	5
26	4	4	6	10	7	10	27	103	70	6	5	5
27	4		6	11	7	9	27	105	69	6	5	5
28	4	4	6	10	7	8	26	107	68	5	4	5
29	4			9	7	8	24	109	50	4	4	5
30	4		7	9	.....	9	27	109	33	3	4	5
31	4	.....		8	.....	10	.....	109	.....	3	4	.....

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Monthly discharge of Starr Creek near Deeth, Nev., for the years ending September 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	9	5	6.0	367
November	7	6	6.5	385
December	7	.....	5.5	337
January	8	.....	4.4	274
February	8	5	6.1	341
March	184	6	28.9	1,780
April	37	16	24.7	1,470
May	112	36	66.0	4,060
June	56	2	13.0	774
July	4	.5	1.3	79
August	2	.5	1.4	85
September	3	2	2.2	131
The year	184	.5	13.9	10,100
1919-20.				
October	4	4	4.0	246
November	6	.....	4.2	250
December	.....	.....	5.4	331
January	11	.....	7.2	445
February	10	6	7.6	434
March	14	6	8.2	502
April	35	8	24.6	1,460
May	109	20	60.6	3,730
June	167	33	110	6,550
July	30	3	10.9	670
August	5	1	2.6	160
September	5	4	4.3	254
The year	167	1	20.7	15,000

MARYS RIVER NEAR DEETH, NEV.

LOCATION.—In NW. ¼ sec. 31, T. 40 N., R. 60 E., at bridge 300 feet east of Mala Vista ranch house of Nevada Land & Livestock Co. and 20 miles north of Deeth, Elko County.

DRAINAGE AREA.—355 square miles (measured on map of Nevada issued by General Land Office, edition of 1908).

RECORDS AVAILABLE.—November 24, 1902, to July 14, 1903; January 17, 1912, to September 30, 1920.

GAGE.—Chain gage on upstream side of bridge; read by W. H. Woody.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and loose sand; banks below gage subject to caving; control slightly shifting. One channel at all stages. Gage height of zero flow, 1.85 feet, determined July 25, 1919.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 5.24 feet April 30 (discharge, 286 second-feet); minimum discharge, 1 second-foot during a large part of August and September.

Maximum stage recorded during year ending September 30, 1920, 4.90 feet May 22 (discharge, 239 second-feet); minimum stage 1.97 feet August 24 and September 1-3 (discharge, 1 second-foot).

1912-1920: Maximum stage recorded, 6.3 feet May 19 and June 3-7, 1912 (discharge, 439 second-feet); minimum discharge, 1 second-foot in August and September, 1918, 1919, and 1920.

ICE.—Stage-discharge relation affected by ice during winter.

DIVERSIONS.—Station is below all diversions except one small ditch on the Mala Vista ranch, and the Cross ranch diversions about 12 miles below.

REGULATION.—During low-water periods flow is affected by diversions above.

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ACCURACY.—Stage-discharge relation changed July 9, 1920; affected by ice November 13, 1918, to February 19, 1919, and November 27, 1919, to January 30, 1920. Rating curve used until July 8, 1920, well defined below 400 second-feet; curve used July 9 to September 30, 1920, poorly defined. Gage read to hundredths once a day. Daily discharge ascertained by applying daily gage height to rating table except for periods of ice effect for which the discharge was estimated from weather records and observer's notes. Records good, except July 9–20, 1920, and periods of ice effect for which they are poor.

Discharge measurements of Marys River near Deeth, Nev., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Feb. 5	J. W. Bones	[a] 2.36	7.2	Jan. 1	J. W. Bones	[a] 2.85	7.6
Apr. 30	do	5.16	280	May 2	Rowe and Purton	4.11	142
July 25	do	2.03	2.4	July 9	R. R. Rowe	2.97	17.2
				Sept. 16	do	1.98	1.0

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Marys River near Deeth, Nev., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	2	8				10	177	270	80	3	2	1
2	2	7				11	189	269	67	9	2	1
3	2	8				10	201	227	52	12	2	1
4	2	8				11	213	213	45	12	2	1
5	2	10				11	226	205	26	12	2	1
6	2	10	8		6	13	201	191	21	12	2	1
7	2	10				13	226	156	14	11	2	1
8	2	10				11	177	133	12	11	2	1
9	3	12				15	201	133	44	11	2	1
10	3	10				14	189	118	38	9	2	1
11	3	9				12	201	118	31	8	2	1
12	3	8				10	213	105	23	7	2	1
13	3					11	226	103	22	11	2	1
14	3					13	201	103	21	8	2	1
15	3		8		9	14	189	113	13	5	1	1
16	3	8		3		13	200	113	12	7	1	1
17	3					14	190	113	11	5	1	1
18	3					14	205	103	8	4	2	2
19	3					16	230	103	7	4	1	1
20	5				11	22	230	123	6	2	1	1
21	3				11	101	182	123	6	2	1	1
22	4				10	101	194	123	6	2	1	1
23	4				10	142	244	128	6	2	1	1
24	4				11	131	231	113	6	2	1	1
25	3	7			10	142	244	108	6	2	1	1
26	3		5		8	111	272	103	4	2	1	2
27	3				9	131	272	88	4	2	1	2
28	5				11	153	272	88	4	2	1	2
29	6				.....	166	244	108	3	2	1	2
30	5				.....	189	286	108	3	2	1	2
31	7	.....			.....	177	.....	108	.....	2	1	.....

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Daily discharge, in second-feet, of Marys River near Deeth, Nev., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	2	2		8	22	22	57	138	111	36	2	1
2	2	2			24	26	40	145	103	39	2	1
3	2	2			27	16	56	131	76	26	2	1
4	2	2			26	18	39	65	69	18	2	1
5	2	2			29	22	42	73	65	16	2	1
6	2	2			30	26	42	69	82	12	2	1
7	2	3			34	26	74	84	78	12	1	1
8	2	3	4		18	22	71	105	80	16	1	1
9	2	3		9	27	28	81	131	85	18	1	1
10	2	3			20	44	73	153	87	17	1	1
11	2	3			24	40	74	166	88	16	1	1
12	2	3			22	31	58	173	85	14	1	1
13	2	3			27	27	61	191	69	12	1	1
14	2	3			29	39	56	196	59	12	1	1
15	2	3			18	30	116	226	55	11	1	1
16	2	3			22	35	114	226	53	10	1	1
17	2	2			24	27	100	221	61	8	1	1
18	2	4			14	24	73	229	55	8	1	1
19	2	4			16	34	74	230	46	7	1	1
20	2	4		15	14	29	83	234	43	6	1	1
21	2	4			16	35	80	236	38	4	1	1
22	2	4			34	54	88	239	37	3	1	1
23	2	4	8		18	47	80	223	26	3	1	1
24	2	4			18	48	74	213	22	3	1	1
25	2	4		16	8	46	63	183	25	3	1	1
26	2	5			14	42	54	164	31	3	1	1
27	2				18	42	54	152	27	2	1	1
28	2	4		18	18	35	81	125	24	2	1	1
29	2				12	34	92	132	28	2	1	1
30	2				.....	39	120	124	30	2	1	1
31	2	.....		20	.....	40	.....	121	.....	2	1	.....

Monthly discharge of Marys River near Deeth, Nev., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	7	2	3.3	200
November	12	.....	8.1	484
December	.....	.....	6.9	427
January	.....	.....	3.0	184
February	.....	.....	8.3	460
March	189	10	58.1	3,570
April	286	177	218	13,000
May	270	88	136	8,360
June	80	3	20.0	1,190
July	12	2	6.0	367
August	2	1	1.5	91
September	2	1	1.2	71
The year	286	1	39.2	28,400
1919-20.				
October	2	2	2.0	123
November	5	2	3.2	192
December	.....	.....	6.1	373
January	20	.....	12.7	781
February	34	8	21.5	1,240
March	54	16	33.2	2,040
April	120	39	72.3	4,300
May	239	65	164	10,100
June	111	22	57.9	3,450
July	39	2	11.1	682
August	2	1	1.2	73
September	1	1	1.0	60
The year	239	1	32.3	2

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LAMOILLE CREEK NEAR LAMOILLE, NEV.

LOCATION.—In sec. 6, T. 32 N., R. 58 E., 50 feet below tailrace of Elko-Lamoille Power Co.'s plant, 50 feet above first irrigation diversion, 2 miles above Lamoille, and 22 miles southeast of Elko, Elko County.

DRAINAGE AREA.—14 square miles (measured on maps issued by United States Forest Service).

RECORDS AVAILABLE.—May 8, 1915, to September 30, 1920.

GAGE.—Vertical staff on right bank; installed July 4, 1917; read by H. M. Fisel.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and large boulders. Control shifts during high water. One channel at all stages. Point of zero flow at gage height 0.00±0.05 foot, determined July 23, and October 24, 1919; at 0.47 foot, determined September 15, 1920.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 3.18 feet at 7 p. m. May 18 (discharge, 360 second-feet); minimum discharge probably less than 3 second-feet about January 1.

Maximum stage recorded during year ending September 30, 1920, 3.30 feet at 7 p. m. June 7, 8, and 9 (discharge, 377 second-feet); minimum discharge probably less than 3 second-feet in January.

1915–1920: Maximum stage probably occurred in June, 1917, when gage was washed out (discharge probably exceeded 500 second-feet); minimum discharge, 1 second-foot at 7 p. m., January 24, 1918.

ICE.—Stage-discharge relation seriously affected by ice each winter.

DIVERSIONS.—Above all irrigation diversions. Water is diverted for Elko-Lamoille Power Co.'s plant, but returned to stream about 50 feet above gage.

REGULATION.—A daily fluctuation occurs on days when power plant is not in continuous operation.

ACCURACY.—Stage-discharge relation changed May 28, 1919, during period of ice effect in 1920, and May 28, 1920; affected by ice December 11, 1918, to January 17, 1919, and during winter of 1919–20. Rating curves fairly well defined. Gage read to hundredths twice a day; readings unreliable December 1, 1919, to May 1, 1920. Daily discharge determined by applying daily mean gage height to rating table except for period of ice effect, December 11, 1918, to January 17, 1919, and December 1, 1919, to May 1, 1920, for which record was not used. For period of ice effect, discharge was estimated from weather records and observer's notes. For period of unreliable gage-height record, monthly discharge was estimated. Records fair.

Discharge measurements of Lamoille Creek near Lamoille, Nev., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Dec. 13	J. W. Bones	[a] 0.74	5.6	Jan. 3	J. W. Bones	[a] .80	2.8
				21	do	.57	4.0
1919.				May 3	Rowe and Purton	1.03	19.0
Feb. 4	do	.68	6.4	July 8	R. R. Rowe	1.94	98
Apr. 29	do	1.70	94	Sept. 15	do	.89	6.1
July 23	do	.81	14.8				
Oct. 24	do	.64	6.1				

[a] Stage-discharge relation affected by ice.

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Daily discharge, in second-feet, of Lamoille Creek near Lamoille, Nev., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	7	10	8		6	6	12	163	136	48	12	4
2	7	9	8		6	6	12	178	149	42	11	5
3	8	9	7		6	5	13	176	154	40	11	4
4	9	10	8		6	6	16	199	144	38	11	4
5	8	9	8	3	6	6	18	185	141	36	11	5
6	11	9	8		6	6	18	186	138	36	10	6
7	9	8	8		6	6	18	193	125	33	10	7
8	10	8	8		6	6	17	178	112	33	10	7
9	9	8	8		6	6	17	164	102	31	10	4
10	9	9	6		6	5	17	154	100	33	8	4
11	8	9			6	6	19	164	93	30	8	4
12	8	9			5	6	20	185	86	29	7	4
13	8	8			6	6	21	208	86	28	7	4
14	8	9		4	6	6	20	220	84	26	8	4
15	9	8	5		6	6	19	215	86	26	6	4
16	11	9			5	6	20	217	82	25	6	4
17	10	9			6	6	23	218	87	24	6	4
18	12	8		6	6	6	30	257	79	22	6	4
19	11	8		6	5	6	30	274	77	20	5	4
20	12	8		6	6	7	33	279	75	18	5	4
21	12	8		7	5	7	39	266	72	18	5	4
22	12	8		6	6	6	50	293	67	18	5	4
23	12	7		7	6	6	62	260	63	15	5	4
24	11	9		6	6	8	76	251	61	14	5	4
25	12	7		6	6	8	90	266	58	12	5	4
26	11	7	4	5	6	8	94	253	56	12	4	3
27	10	8		5	6	8	97	278	54	12	3	3
28	10	6		6	6	10	103	295	52	12	4	4
29	10	7		6	.....	11	120	278	49	16	4	5
30	10	9		6	.....	11	146	202	46	14	3	5
31	10	.....		6	.....	11	.....	161	.....	12	4	.....
1919-20.												
1	7	7	.....	.....	.....	.....	.....	19	264	141	32	10
2	6	7	.....	.....	.....	.....	.....	19	234	148	30	10
3	6	6	.....	.....	.....	.....	.....	19	224	138	30	6
4	6	7	.....	.....	.....	.....	.....	25	264	124	28	10
5	5	7	.....	.....	.....	.....	.....	26	274	116	29	11
6	5	6	.....	.....	.....	.....	.....	32	314	116	26	10
7	6	6	.....	.....	.....	.....	.....	41	356	110	27	9
8	6	5	.....	.....	.....	.....	.....	50	335	97	24	8
9	6	5	.....	.....	.....	.....	.....	50	356	105	24	9
10	6	7	.....	.....	.....	.....	.....	66	314	91	24	8
11	5	8	.....	.....	.....	.....	.....	71	304	88	21	8
12	5	5	.....	.....	.....	.....	.....	69	294	79	23	8
13	6	5	.....	.....	.....	.....	.....	68	304	70	23	7
14	7	6	.....	.....	.....	.....	.....	72	274	70	15	6
15	7	6	.....	.....	.....	.....	.....	73	284	66	16	6
16	7	7	.....	.....	.....	.....	.....	82	244	63	18	7
17	7	7	.....	.....	.....	.....	.....	106	254	63	13	6
18	6	6	.....	.....	.....	.....	.....	134	244	63	13	6
19	7	7	.....	.....	.....	.....	.....	174	264	63	13	7
20	7	7	.....	.....	.....	.....	.....	220	254	58	12	6
21	6	5	.....	.....	.....	.....	.....	268	284	56	11	7
22	7	5	.....	.....	.....	.....	.....	301	254	51	11	6
23	7	6	.....	.....	.....	.....	.....	281	244	46	11	8
24	7	7	.....	.....	.....	.....	.....	277	215	48	10	8
25	7	6	.....	.....	.....	.....	.....	277	186	45	15	8
26	5	6	.....	.....	.....	.....	.....	297	150	41	12	9
27	6	5	.....	.....	.....	.....	.....	307	116	39	13	9
28	7		.....	.....	.....	.....	.....	337	127	39	15	8
29	7	4	.....	.....	.....	.....	.....	346	150	39	11	10
30	7		.....	.....	.....	.....	.....	337	150	36	11	8
31	7	.....	.....	.....	.....	.....	.....	274	.....	36	10	.....

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Monthly discharge of Lamoille Creek near Lamoille, Nev., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	12	7	9.8	603
November	10	6	8.3	496
December	8	.....	5.5	339
January	7	.....	4.6	283
February	6	5	5.9	325
March	11	5	6.9	422
April	146	12	42.3	2,520
May	295	154	220	13,500
June	154	46	90.5	5,390
July	48	12	24.9	1,530
August	12	3	6.9	427
September	7	3	4.3	258
The year	295	.....	36.1	26,100
1919–20.				
October	7	5	6.3	389
November	8	.....	5.7	339
December	.....	.....	3.0	184
January	.....	.....	3.0	184
February	.....	.....	4.0	230
March	.....	.....	5.0	307
April	.....	.....	10.0	595
May	346	19	152	9,350
June	356	116	251	14,900
July	148	36	75.6	4,650
August	32	10	18.4	1,130
September	11	6	8.0	474
The year	356	.....	45.2	32,700

LAMOILLE CREEK NEAR HALLECK, NEV.

LOCATION.—In NW. ¼ sec. 9, T. 35 N., R. 58 E., half a mile below mouth of Secret Creek, largest tributary, 1½ miles south of Halleck, Elko County, on Southern Pacific Railroad, and 2 miles above confluence with Humboldt River.

DRAINAGE AREA.—245 square miles.

RECORDS AVAILABLE.—May 12, 1913, to September 30, 1919, when station was discontinued.

GAGE.—Vertical staff on left bank, 200 feet below ford; read by F. W. Randolph. Datum lowered 1.00 foot August 19, 1915; datum raised 2.5 feet September 20, 1917.

DISCHARGE MEASUREMENTS.—Made from cable 200 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel. Control is gravel bar, which shifts occasionally and at times is affected by beaver dams. Channel very crooked; both banks were overflowed during floods.

EXTREMES OF DISCHARGE.—Not determined for year ending September 30, 1919.

1913–1918: Maximum stage recorded, 6.7 feet, June 5, 1914 (discharge, 556 second-feet); minimum stage, creek dry for a time nearly every summer.

ICE.—Stage-discharge relation seriously affected by ice in winter.

DIVERSIONS.—Below all diversions except one small ditch.

REGULATION.—Flow affected by irrigation diversions above.

ACCURACY.—Stage-discharge relation permanent for period of record. Rating curve well defined. Gage read three times a week to hundredths. Daily discharge ascertained by applying gage height to rating table and interpolating for days when gage was not read. Records fair.

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Discharge measurements of Lamoille Creek near Halleck, Nev., during the year ending Sept. 30, 1919.

[Made by J. W. Bones.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Dec. 14	[a] 1.55	7.0	Apr. 7	1.87	44.6	July 26		0
Feb. 3	1.45	14.6	May 1	1.81	38.7			

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Lamoille Creek near Halleck, Nev., for the year ending Sept. 30, 1919.

Day.	Feb.	Mar.	Apr.	May.	June.	Day.	Feb.	Mar.	Apr.	May.	June.
1	15	20	46	36	168	16	20	40	37	39	38
2	15	20	44	39	153	17	17	41	37	40	20
3	15	20	43	53	147	18	14	44	38	42	3
4	15	18	44	54	141	19	12	46	38	43	3
5	15	16	44	55	140	20	14	52	38	53	3
6	16	15	44	55	140	21	15	58	38	63	3
7	16	15	44	55	139	22	17	63	38	85	2
8	17	14	40	51	124	23	17	63	38	107	1
9	20	16	35	47	112	24	17	63	38	129	1
10	24	17	36	43	100	25	17	64	38	151	.....
11	24	28	37	40	88	26	17	65	38	173	.....
12	24	38	38	38	88	27	18	63	35	176	.....
13	24	39	38	38	88	28	19	60	35	179	.....
14	24	39	38	38	88	29	.....	58	34	180	.....
15	24	40	38	39	63	30	.....	54	34	182	.....
						31	.....	50	.....	183	.....

NOTE.—No flow Oct. 1-5 and June 25 to Sept. 30. No record Oct. 6 to Dec. 13. Data inadequate for determination of discharge Dec. 14 to Jan. 31.

Monthly discharge of Lamoille Creek near Halleck, Nev., for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
February	24	12	17.9	994
March	65	14	40.0	2,460
April	46	34	38.8	2,310
May	183	36	80.8	4,970
June	168	0	61.8	3,680
July	0	0	0	0
August	0	0	0	0
September	0	0	0	0
The period	.....	.....	.....	14,400

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SECRET CREEK NEAR HALLECK, NEV.

LOCATION.—In NE. ¼ NW. ¼ sec. 1, T. 34 N., R. 59 E., at Ryan's ranch, 500 feet from Secret Pass highway, half a mile below mouth of Doisey Creek, three-quarters of a mile above old private gage at Sotty's mine, 12 miles above confluence with Lamoille Creek, and 15 miles southeast of Halleck, Elko County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 28, 1917, to September 30, 1920.

GAGE.—Vertical staff on right bank, 75 feet below lower fence on Ryan's ranch; read by J. M. Ryan.

DISCHARGE MEASUREMENTS.—Made by wading at gage.

CHANNEL AND CONTROL.—Bed composed of sand and gravel; one channel except at extremely high stages when water runs through shallow overflow channel on right bank. Control is coarse gravel bar which is fairly permanent. Stage of zero flow at gage height 0.55 foot, determined July 24, 1919, and at 0.45 foot, determined September 16, 1920.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 1.82 feet at 6 p. m. April 3 (discharge, 76 second-feet); discharge probably zero during most of August and September, and possibly during first part of January.

Maximum stage recorded during year ending September 30, 1920, 2.09 feet on May 10 (discharge, 112 second-feet); minimum discharge, 1 second-foot several days in August and September.

1917–1920: Maximum stage recorded, 2.71 feet at 5 p. m. June 4, 1917 (discharge, 170 second-feet); minimum discharge probably zero during August and September, 1919.

ICE.—Stage-discharge relation affected by ice in winter.

DIVERSIONS.—Station is below Secret Valley and Ryan's ranch diversions; the "71" ranch diverts water 4 to 6 miles below.

REGULATION.—Flow affected by irrigation diversions above.

ACCURACY.—Stage-discharge relation changed during each winter; affected by ice November 30, 1918, to March 13, 1919. Rating curves fairly well defined. Gage read to hundredths once a day except as indicated in footnote to daily discharge table. No record August 3, 1919, to March 6, 1920. Daily discharge determined by applying daily gage height to rating table and interpolating for days when gage was not read. Discharge November 30, 1918, to March 13, 1919, estimated, because of ice, from two current-meter measurements, observer's notes, and temperature records. Records good.

Discharge measurements of Secret Creek near Halleck, Nev., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
1918.				1919.			
Dec. 13	J. W. Bones	[a] 1.03	3.2	Oct. 24	J. W. Bones	0.85	3.6
1919.				1920.			
Feb. 4	do	[a] .90	2.0	May 2	Rowe and Purton	1.62	61
Apr. 30	do	1.42	36.4	July 9	R. R. Rowe	.85	6.7
July 24	do	.73	[b] .8	Sept. 16	do	.65	.8

[a] Stage-discharge relation affected by ice. [b] Discharge estimated.

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Daily discharge, in second-feet, of Secret Creek near Halleck, Nev., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	2	3					57	39	9	2	1	.....
2	3	3			2		44	38	9	2	1	.....
3	3	3					61	37	10	2	.....	.....
4	2	4			2		51	34	8	2	.....	.....
5	2	4					63	33	8	2	.....	.....
6	5	4	3				48	29	8	2	.....	.....
7	3	4			3	5	31	29	9	2	.....	.....
8	3	4		1			24	29	8	2	.....	.....
9	3	4					33	28	7	2	.....	.....
10	3	4					28	27	6	1	.....	.....
11	3	4					40	26	6	1	.....	.....
12	3	4					33	26	7	1	.....	.....
13	3	4	3				39	21	7	1	.....	.....
14	3	4				5	42	24	6	1	.....	.....
15	3	4				6	40	21	5	1	.....	.....
16	3	4			4	6	29	23	5	1	.....	.....
17	3	4				7	31	21	5	1	.....	.....
18	4	4				7	61	20	4	1	.....	.....
19	4	4				9	48	21	4	1	.....	.....
20	4	4				12	57	18	3	1	.....	.....
21	4	4				12	44	16	3	1	.....	.....
22	3	3	2			13	46	17	3	1	.....	.....
23	3	3				14	48	17	4	1	.....	.....
24	3	3		2		12	48	17	3	1	.....	.....
25	3	3			3	18	48	17	3	1	.....	.....
26	3	3				18	44	16	3	1	.....	.....
27	4	3				33	39	14	2	1	.....	.....
28	4	3				30	34	11	2	1	.....	.....
29	4	3			.....	58	40	11	2	1	.....	.....
30	3	2			.....	55	38	10	2	1	.....	.....
31	3	.....			.....	72	.....	10	.....	1	.....	.....
1919-20.												
1	.....	.....	.....	.....	.....	.....	15	79	49	13	2	2
2	.....	.....	.....	.....	.....	.....	14	61	47	14	1	2
3	.....	.....	.....	.....	.....	.....	14	55	42	13	1	2
4	.....	.....	.....	.....	.....	.....	19	56	35	10	1	10
5	.....	.....	.....	.....	.....	.....	49	59	36	10	1	3
6	.....	.....	.....	.....	.....	.....	89	63	35	9	1	3
7	.....	.....	.....	.....	.....	9	102	65	35	8	1	3
8	.....	.....	.....	.....	.....	9	40	69	31	7	1	2
9	.....	.....	.....	.....	.....	10	50	79	34	7	2	2
10	.....	.....	.....	.....	.....	9	59	112	33	7	2	2
11	.....	.....	.....	.....	.....	9	69	88	35	7	2	1
12	.....	.....	.....	.....	.....	11	80	67	29	5	2	2
13	.....	.....	.....	.....	.....	10	59	67	29	5	2	2
14	.....	.....	.....	.....	.....	10	77	67	25	5	2	2
15	.....	.....	.....	.....	.....	12	49	66	25	4	1	2
16	.....	.....	.....	.....	.....	10	31	66	25	4	1	1
17	.....	.....	.....	.....	.....	10	24	65	22	4	1	2
18	.....	.....	.....	.....	.....	7	61	68	23	4	1	2
19	.....	.....	.....	.....	.....	13	80	69	19	4	1	2
20	.....	.....	.....	.....	.....	25	65	74	19	3	1	2
21	.....	.....	.....	.....	.....	49	37	71	17	3	1	2
22	.....	.....	.....	.....	.....	16	59	67	16	3	1	2
23	.....	.....	.....	.....	.....	16	51	68	16	4	1	2
24	.....	.....	.....	.....	.....	14	59	65	14	3	1	2
25	.....	.....	.....	.....	.....	14	45	61	14	3	2	3
26	.....	.....	.....	.....	.....	12	51	59	14	3	2	3
27	.....	.....	.....	.....	.....	11	54	54	14	4	2	3
28	.....	.....	.....	.....	.....	11	54	49	14	3	2	3
29	.....	.....	.....	.....	.....	12	67	51	12	3	3	3
30	.....	.....	.....	.....	.....	19	69	50	12	2	2	3
31	.....	.....	.....	.....	.....	16	.....	49	.....	2	2	.....

NOTE.—Gage not read, and discharge interpolated, Apr. 22, 27, May 8-11, June 14, July 25-29, 1919; Mar. 8, 10, 28, Apr. 9, 10, Aug. 8, and Sept. 17, 1920. No record Aug. 3, 1919, to Mar. 6, 1920.

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Monthly discharge of Secret Creek near Halleck, Nev., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	5	2	3.2	196
November	4	2	3.6	212
December	.....	.....	2.4	149
January	.....	.....	1.5	93
February	.....	.....	3.2	178
March	72	.....	14.6	898
April	63	24	43.0	2,560
May	39	10	22.6	1,390
June	10	2	5.4	320
July	2	1	1.3	79
The period	.....	.....	.....	6,080
1920.				
March 7–31	49	7	13.8	684
April	102	14	53.1	3,160
May	112	49	65.8	4,050
June	49	12	25.7	1,530
July	14	2	5.7	349
August	3	1	1.5	91
September	10	1	2.5	151
The period	.....	.....	.....	10,000

NORTH FORK OF HUMBOLDT RIVER AT DEVILS GATE, NEAR HALLECK, NEV.

LOCATION.—In sec. 13, T. 38 N., R. 57 E., at narrows 3½ miles above buildings of Charles Clayton ranch (also known as Devils Gate ranch), 17 miles north of Halleck, Elko County, and 27 miles by wagon road from Elko.

DRAINAGE AREA.—830 square miles (measured on General Land Office maps).

RECORDS AVAILABLE.—November 11, 1913, to September 30, 1920; also at mouth of stream from October 10, 1902, to December 31, 1909, and October 1, 1910, to December 31, 1913.

GAGE.—Stevens continuous water-stage recorder on right bank; inspected by C. H. Crane and Mrs. J. C. McInnis. Also inside vertical enamel staff and outside inclined staff gages.

DISCHARGE MEASUREMENTS.—Made from cable about 30 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of sand with gravel riffle at control. About half of the control section is affected by growth of moss. Channel crooked. Banks comparatively high and covered with willows. At extremely high stages, water may overflow right bank and pass in an overflow channel around gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 6.97 feet at 6 a. m. March 24 (discharge, 763 second-feet); minimum discharge not determined.

Not determined for year ending September 30, 1920.

1913–1919: Maximum stage estimated 9.0 feet at 8 p. m. April 9, 1917 (discharge, 1,260 second-feet); minimum discharge, 1 second-foot, August 20–28 and September 30, 1913.

ICE.—Stage-discharge relation seriously affected by ice in winter.

DIVERSIONS.—Numerous diversions in the valley above and below Devils Gate. During the summer almost all low-water flow is diverted.

REGULATION.—Flow during summer depends on amount of irrigation above. A small flow is maintained from seepage and springs.

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ACCURACY.—Stage-discharge relation affected by moss on control during low water; permanent at high stages; affected by ice November 25, 1918, to February 9, 1919, February 13, 14, and November 25, 1919, to January 30, 1920. Rating curves well defined. Operation of water-stage recorder satisfactory October 1, 1918, to May 27, 1919, November 6–30, 1919, and June 18 to August 8, 1920, except April 3, and 27–30, 1919. Only five gage readings were obtained June to November, 1919. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph, except for period when stage-discharge relation was affected by ice and when gage-height record was missing. For these periods, discharge was estimated from meter measurements, weather records, observer's notes, and comparison with Humboldt River at Palisade. Records good except for periods estimated, for which they are fair.

Discharge measurements of North Fork of Humboldt River at Devils Gate, near Halleck, Nev., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Feb. 5	J. W. Bones	1.39	17.7	Jan. 2	J. W. Bones	[a] 2.16	13.1
Apr. 5	do	5.25	410	May 1	Purton and Rowe	4.13	170
July 28	do	1.10	2.4	July 10	R. R. Rowe	1.73	18.0
Nov. 6	do	1.37	15.8	Sept. 17	do	1.40	9.6

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of North Fork of Humboldt River at Devils Gate, near Halleck, Nev., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	6	11				27	415	287				
2	6	11				28	400	275				
3	7	11			17	28	405	265				
4	7	11				30	410	257				4
5	7	11			18	32	368	252			3	
6	8	12				35	268	237				
7	8	13				32	218	218				4
8	8	12		10	21	30	196	202				
9	8	13				30	188	196				
10	8	12			25	30	204	192			4	
11	8	12			25	30	242	189				
12	8	12			28	28	274	181				
13	8	12			27	28	291	170				
14	8	12			28	30	244	163				
15	9	13			30	30	225	160				3
16	9	13	12		28	30	210	156				
17	9	13			28	34	220	158				
18	10	13			27	45	252	162				
19	10	14			29	100	260	170				
20	10	13			27	230	261	177				
21	10	13			27	571	264	188			4	
22	10	13			27	592	270	217				3
23	10	12		15	27	529	279	244				
24	10	12			29	647	290	275				
25	10				28	571	307	287				
26	10				27	404	332	277				4
27	10	10			28	374		247				
28	10				27	368	310			2		
29	11					339		210				
30	11					365				2		
31	11					420						

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Daily discharge, in second-feet, of North Fork of Humboldt River at Devils Gate, near Halleck, Nev., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1								170		38	10	
2		16		13						37	10	
3										40	10	
4		17								34	10	
5	8	16								31	10	
6		16								28	10	
7		16								23	9	
8		15								20	9	
9		15								18		10
10		16								18		
11		16								17		
12		17								16		
13		19								16		
14		20								15		
15		19								14		
16		17								14		
17		17								13		10
18		18							134	12		
19		18						167	141	12		
20		18				40			102	12	10	
21		18							83	11		
22		18							71	11		
23		17							63	11		
24		17							54	11		
25									48	12		
26									44	12		
27		15							42	11		
28									39	11		
29									38	11		
30						77			38	11		
31										10		

Monthly discharge of North Fork of Humboldt River at Devils Gate, near Halleck, Nev., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	11	6	8.9	545
November	14		11.8	702
December			12.0	738
January			12.6	775
February	30		24.7	1,370
March	647	27	196	12,160
April	415	188	284	16,900
May	287		214	13,200
August			3.7	228
September			3.5	208
1919–20.				
October			11.0	676
November	20		16.6	988
December			14.0	861
January			15.0	922
June 18–30	141	38	69.0	1,780
July	40	10	17.7	1,090
August	10		9.9	611
17			10.0	337

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SOUTH FORK OF HUMBOLDT RIVER NEAR ELKO, NEV.

LOCATION.—In sec. 19, T. 33 N., R. 55 E., at head of canyon below Cowling's ranch, 4 miles above mouth and 10 miles southwest of Elko, Elko County.

DRAINAGE AREA.—Not measured (1,150 square miles at old station 1½ miles above).

RECORDS AVAILABLE.—August 29, 1896, to December 31, 1909; September 9, 1910, to September 30, 1920.

GAGE.—Stevens continuous water-stage recorder on right bank 1½ miles below highway bridge since November 14, 1913; inspected by Gerald Clayton. Also inside hook and outside inclined staff gages.

DISCHARGE MEASUREMENTS.—Made from cable 110 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and sand. Basalt dike a short distance below gage affords permanent control. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 2.84 feet at 11.30 a. m. May 5 (discharge, 369 second-feet); river dry June 24 to September 30.

Not determined for year ending September 30, 1920.

1896–1919: Maximum stage recorded, 10.0 feet, January 26, 1914 (discharge, 2,400 second-feet); minimum stage, river dry at times in 1915, 1916, 1918, and 1919.

ICE.—Stage-discharge relation seriously affected by ice each winter.

DIVERSIONS.—Below all tributaries and all diversions except those of Hunter & Banks ranch 3 miles downstream.

REGULATION.—Flow affected by diversions above.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 450 second-feet, and fairly well defined up to 1,200 second-feet. Operation of water-stage recorder satisfactory October 1-16, 1918, April 3 to June 15, and October 31 to November 26, 1919, and May 10 to June 30, 1920. Daily discharge for these periods ascertained by applying to rating table the daily mean gage height determined from recorder graph. Daily discharge not determined for other periods. River dry June 24 to October 30, 1919, and August 15 to September 30, 1920. Means of discharge estimated for various periods June 16–23, and November 27–30, 1919, and July 1 to August 15, 1920. Records published are good.

Discharge measurements of South Fork of Humboldt River near Elko, Nev., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Dec. 5	J. W. Bones	[a] 1.06	6.5	Oct. 31	J. W. Bones	0.04	0.8
1919.				Nov. 14	do	.35	3.3
Feb. 6	do	[a] 1.82	12.1	1920.			
Apr. 3	do	2.20	200	Jan. 22	do	[a] 2.40	12.3
July 20	do		0	Apr. 30	Purton and Rowe	1.55	90
				30	Rowe and Purton	1.60	96
				Sept. 15	R. R. Rowe		0

[a] Stage-discharge relation affected by ice.

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Daily discharge, in second-feet, of South Fork of Humboldt River near Elko, Nev., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Apr.	May.	June.	Day.	Oct.	Apr.	May.	June.
1918–19.					1918–19.				
1	4	.....	306	163	16	9	118	252	
2	6	.....	320	131	17	.....	112	238	
3	11	170	344	118	18	.....	120	243	
4	9	219	341	100	19	.....	134	273	
5	9	203	356	87	20	.....	142	275	10
6	12	178	317	73	21	.....	156	284	
7	13	154	308	64	22	.....	170	281	
8	8	140	297	58	23	.....	199	309	
9	6	129	268	53	24	.....	226	314	0
10	7	120	233	48	25	.....	248	284	.....
11	8	123	208	44	26	.....	252	273	.....
12	8	124	214	40	27	.....	255	252	.....
13	8	132	219	37	28	.....	250	260	.....
14	8	139	228	33	29	.....	255	284	.....
15	9	128	240	28	30	.....	289	306	.....
					31	.....	.....	219	.....

Day.	Oct.	Nov.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.										
1		2	.....	.....	.....	.....	359	.....	3	
2		2	.....	.....	.....	.....	314	.....		
3		2	.....	.....	.....	.....	275	.....		
4		2	.....	.....	.....	.....	286	.....		
5		2	.....	.....	.....	.....	286	.....		
6		3	.....	.....	.....	.....	306	.....		
7		4	.....	.....	.....	.....	292	.....		
8		4	.....	.....	.....	.....	338	.....		
9		4	.....	.....	.....	.....	388	.....	2	
10		5	.....	.....	.....	289	418	.....		
11		7	.....	.....	.....	300	382	.....		
12		7	.....	.....	.....	248	359	.....		
13		6	.....	.....	.....	219	335	.....		
14		4	.....	.....	.....	189	335	37		
15		3	.....	.....	.....	161	312	.....		
	0									0
16		4	.....	.....	.....	165	294	.....		
17		4	.....	.....	.....	188	289	.....		
18		4	.....	.....	.....	231	273	.....		
19		5	.....	33	.....	270	265	.....		
20		7	.....	.....	.....	312	262	.....		
21		5	.....	.....	.....	382	252	.....		
22		5	12	.....	142	404	250	.....		
23		5	.....	.....	.....	411	235	.....		
24		5	.....	.....	.....	388	212	.....	0	
25		7	.....	.....	.....	341	191	.....		
26		6	.....	.....	.....	320	168	.....		
27			.....	.....	.....	306	149	.....		
28		5	.....	.....	.....	338	128	.....		
29			.....	.....	.....	369	112	.....		
30			.....	51	94	404	97	.....		
31	1	.....	.....	.....	.....	411	.....	.....		.....

Monthly discharge of South Fork of Humboldt River near Elko, Nev., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919.				
April 3–30	289	112	174	9,660
May	356	208	276	17,000
June	163	0	38.6	2,300
July	0	0	0	0
August	0	0	0	0
September	0	0	0	0
The period	.....	.....	.....	29,000

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Monthly discharge of South Fork of Humboldt River near Elko, Nev., for the years ending Sept. 30, 1919 and 1920—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919-20.				
October	1	0	.03	2
November	7	2	4.5	266
May 10-31	411	161	302	13,200
June	418	97	272	16,200
July	.....	.....	35.0	2,150
August	3	0	1.0	61
September	0	0	0	0

MAGGIE CREEK AT CARLIN, NEV.

LOCATION.—In sec. 26, T. 33 N., R. 52 E., 700 feet above highway bridge, half a mile above confluence with Humboldt River, and half a mile east of Carlin, Elko County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 6, 1913, to September 30, 1920.

GAGE.—Vertical staff on right bank about 800 feet above Pacific Fruit Express Co.'s dam; installed September 22, 1917; read by R. Tank.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel; shifts occasionally. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 2.65 feet at 5 p. m. April 5 (discharge, 160 second-feet); minimum discharge, no flow July 22 to September 30.

Maximum stage recorded during year ending September 30, 1920, 2.08 feet on May 3 (discharge, 85 second-feet); creek dry in October, July, August, and September.

1913-1920: Maximum stage recorded, 4.5 feet April 28, 1914 (discharge, 394 second-feet); no flow July 22 to October 24, 1919, and July 15 to September 30, 1920.

ICE.—Stage-discharge relation seldom affected by ice.

DIVERSIONS.—No information.

ACCURACY.—Stage-discharge relation changed April 5, 1919; affected by backwater from temporary dam November 12-25, 1918, December 23, 1918, to January 31, 1919, and November 11 to December 20, 1919. Rating curves well defined below 20 second-feet and fairly well defined above. Gage read to hundredths twice a day. Gage readings after June 1, 1920, are of no value as small stream was meandering over creek bed. Daily discharge ascertained by applying daily mean gage height to rating table, except for periods when stage-discharge relation was affected by backwater from dam, and June 1 to July 15, 1920. For these periods discharge was estimated. Records fair.

Discharge measurements of Maggie Creek at Carlin, Nev., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Dec. 12	J. W. Bones	1.14	1.9	Jan. 4	J. W. Bones	0.46	.4
				May 9	Rowe and Purton	1.90	65.7
1919.				21	R. R. Rowe	1.68	47.2
Apr. 4	do	2.52	128	July 7	do	.57	.2
May 4	do	1.89	65	Sept. 18	do	.50	.02
Aug. 5	do	.....	0				

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Daily discharge, in second-feet, of Maggie Creek at Carlin, Nev., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	2	1	1		1	6	123	88	35	7		
2	2	1	1		2	5	125	80	33	7		
3	2	1	1		3	7	126	72	37	7		
4	2	1	2		5	11	129	65	33	7		
5	2	1	2		4	11	150	60	24	6		
6	2	1	2		4	7	136	56	23	6		
7	2	2	2		4	5	103	55	23	5		
8	2	2	3		4	3	92	60	23	5		
9	3	2	2		5	3	71	56	21	5		
10	3	2	2		6	3	67	55	16	5		
11	3	1	2		7	3	76	38	13	5		
12	3		2		7	4	74	31	11	4		
13	4		2		7	6	83	23	10	3		
14	3		1		5	6	90	23	8	3		
15	3		2	0.5	3	5	74	20	11	2	0	0
16	3		1		4	6	68	21	12	1		
17	3		1		3	12	56	26	12	1		
18	3	1	1		3	22	61	24	12	1		
19	3		1		3	32	66	20	12			
20	2		1		2	38	76	14	10	.5		
21	2		2		2	64	86	10	10			
22	2		1		3	50	87	8	10	0		
23	1				3	54	87	8	9			
24	1				3	80	98	6	8			
25	1				3	84	103	8	8			
26	1	1			3	64	121	18	8			
27	1	1	1		3	74	115	31	7	0		
28	1	1			4	81	101	29	7			
29	1	1			.....	86	90	31	7			
30	1	1			.....	109	90	33	7			
31	1	.....			.....	115	.....	37	.....			.....
1919-20.												
1		6		.4	13	27	33	80				
2		8		.4	16	29	27	83				
3		8		.4	20	27	21	85				
4		8		.4	20	25	17	74				
5		6		.4	19	27	21	74	10			
6		6		.4	20	29	28	72				
7		6		.4	22	30	33	72				
8		6		.4	25	30	40	70		.2		
9		5		.4	23	31	43	68				
10		5	2	.4	19	31	49	68				
11				.4	16	32	52	68				
12	0			.4	13	32	49	64				
13				.4	13	32	51	57				
14				.5	13	32	57	57				
15				.5	18	34	57	59	2		0	0
16				.5	21	34	62	57				
17				1.0	26	34	57	55				
18				1.0	29	32	57	54				
19				3.0	29	30	57	52				
20		4		5.0	31	31	57	49				
21			.5	7.0	31	32	57	47				
22			.5	8.0	30	32	56	47				
23			.5	8.0	34	33	56	44		0		
24			.5	8.0	31	34	55	43				
25	1		1.0	8.0	26	34	57	37	.5			
26	1		.5	7.0	22	34	59	34				
27	3		.5	6.0	20	35	59	30				
28	3		.5	6.0	20	37	62	22				
29	6		.5	8.0	22	34	64	22				
30	6		.4	10	.....	34	76	22				
31	6	.....	.4	11	.....	34	.....	21	.....			.....

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Monthly discharge of Maggie Creek at Carlin, Nev., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	4	1	2.1	129
November	.....	1	1.1	67
December	3	.....	1.4	87
January	.....	.....	.50	31
February	7	1	3.8	210
March	115	3	34.1	2,100
April	150	56	94.1	5,600
May	88	6	35.7	2,200
June	37	7	15.3	910
July	7	0	2.63	162
August	0	0	0	0
September	0	0	0	0
The year	150	0	15.9	11,500
1919–20.				
October	6	0	.8	52
November	8	.....	4.8	285
December	.....	.4	1.48	91
January	11	.4	3.35	206
February	34	13	22.1	1,270
March	37	25	31.7	1,950
April	76	17	49.0	2,920
May	85	21	54.4	3,340
June	.....	.....	4.17	248
July	.....	0	.10	6
August	0	0	0	0
September	0	0	0	0
The year	85	0	14.3	10,400

ROCK CREEK NEAR BATTLE MOUNTAIN, NEV.

LOCATION.—In NE. ¼ sec. 17, T. 34 N., R. 48 E., at mouth of canyon, below all tributaries, half a mile above highway bridge on Overland Trail, in Eureka County, 25 miles northeast of Battle Mountain, Lander County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 26, 1918, to September 30, 1920.

GAGE.—Stevens continuous water-stage recorder on left bank installed March 26, 1918; inspected by Frank Eads. Also inside float gage and outside vertical staff gage.

DISCHARGE MEASUREMENTS.—Made by wading near gage or from highway bridge half a mile downstream.

CHANNEL AND CONTROL.—One channel at all stages. Banks high and not subject to overflow. Stream bed composed of gravel and boulders. Principal control is rock riffle 50 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, from water-stage recorder, 3.65 feet at 5 a. m. March 21 (discharge, estimated 700 second-feet); no flow October 17–24 and July to September.

Maximum stage during year ending September 30, 1920, from water-stage recorder, 2.55 feet at 10 p. m. April 20 (discharge, 212 second-feet); no flow October 1–11 and July 14 to September 16.

1918–1920: Maximum stage, from water-stage recorder, 3.65 feet at 5 a. m. March 21, 1919 (discharge, 700 second-feet); no flow during parts of July, August and September each year.

ICE.—Usually affected by ice.

DIVERSIONS.—There are diversions in valley above the canyon. Station is above all diversions in Boulder Flat.

REGULATION.—None except by diversion.

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ACCURACY.—Stage-discharge relation changed during winter of 1919–20; affected by ice December 10, 1918, to February 7, 1919, and November 26, 1919, to Febraury 8, 1920. Rating curves well defined below 200 second-feet. Operation of water-stage recorder satisfactory except October 6–16, 1918, March 5–18, April 29 to May 1, and May 3, 1919. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph. Discharge estimated: October 6–16, 1918, from weather records; for periods of ice effect from meter measurements, observer's notes, and temperature records; March 5–18, 1919, from observer's notes and weather records; interpolated April 29 to May 1, and May 3, 1919. Records good.

Discharge measurements of Rock Creek near Battle Mountain, Nev., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 17	J. W. Bones	[a] 1.24	1.1	Jan. 8	J. W. Bones	[a] 0.87	1.1
Apr. 19	do	2.34	173	May 10	A. B. Purton	2.25	133
May 2	do	1.94	86	22	R. R. Rowe	1.84	58
Oct. 22	do	.88	1.9	July 6	do	.90	.7

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Rock Creek near Battle Mountain, Nev., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	3	3	2			99	303	102	34			
2	3	3	2			50	272	79	33			
3	12	2	2			30	256	78	34			
4	10	3	2		6	14	249	76	38			
5	6	3	2				256	72	35			
6		3	3				246	62	33			
7		4	3				237	49	31			
8		3	4		9		210	45	27			
9		3	6		8		185	44	31			
10		3			12		172	39	33			
11	2	3			13	50	164	38	25			
12		3			13		164	38	19			
13		3			19		169	36	27			
14		3			25		167	35	31			
15		4			22		154	33	27			
16		5		2	19		145	35	22	0	0	0
17		4			15		140	39	19			
18		4			17		152	40	14			
19		4			12	76	142	37	15			
20		4	3		12	105	136	32	13			
	0											
21		3			11	354	140	31	10			
22		3			11	196	142	31	5			
23		3			10	193	147	35	4			
24		3			26	347	152	42	4			
25	1	3			24	377	154	40	5			
26	1	5			17	282	167	38	4			
27	2	3			14	286	174	38	3			
28	3	3			38	317	174	35	1			
29	3	3			.....	324	160	31	1			
30	4	3			.....	366	126	31	0			
31	3	.....			.....	362	.....	34	.....			.....

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Daily discharge, in second-feet, of Rock Creek near Battle Mountain, Nev., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1		5				12	43	168	49	16		
2		4				31	34	168	28	16		
3		4				73	27	143	19	11		
4		3		1		31	26	120	16	4		
5		4			2	22	27	103	14	2		
6	0	4				18	45	101	16	1		
7		4				18	83	107	18	1		
8		5		1		20	94	96	18	1		
9		6			2	31	105	101	16	1		0
10		5			3	36	107	127	15	1		
11		4			6	30	97	127	16	1		
12	1	4			6	24	85	109	18	1		
13	1	4			5	20	90	101	18	1		
14	2	5			5	21	90	101	16			
15	1	5			5	28	124	97	16			
			1								0	
16	2	4			7	22	155	97	19			
17	2	4			7	22	155	69	30			1
18	2	3			9	18	120	83	27			1
19	2	3			10	17	158	112	29			1
20	2	2		1	17	18	181	72	27			1
21	2	3			18	28	181	59	24			1
22	2	3			12	48	138	52	21	0		1
23	2	2			8	52	118	49	13			1
24	2	2			13	46	108	49	11			1
25	2	1			8	35	97	48	11			1
26	2				7	33	97	45	6			1
27	2				7	28	112	44	5			1
28	3	1			7	25	131	43	4			1
29	3				8	24	140	42	6			1
30	4				.....	25	162	43	8			1
31	5	.....			.....	31	.....	43	.....			.....

Monthly discharge of Rock Creek near Battle Mountain, Nev., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	12	0	2.4	144
November	5	2	3.3	196
December	.....	.....	3.0	183
January	.....	.....	2.0	123
February	38	.....	13.9	772
March	377	.....	144	8,850
April	308	126	182	10,800
May	102	31	45.0	2,770
June	38	0	19.3	1,150
July	.....	.....	0	0
August	.....	.....	0	0
September	.....	.....	0	0
The year	377	0	34.6	25,000
1919-20.				
October	5	0	1.4	87
November	6	.....	3.3	195
December	.....	.....	1.0	61
January	.....	.....	1.0	61
February	18	.....	6.4	369
March	73	12	28.6	1,760
April	181	26	104	6,190
May	168	42	87.7	5,390
June	49	4	17.8	1,060
July	16	0	1.8	113
August	0	0	0	0
September	1	0	.5	28
The year	181	0	21.1	15,300

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HUMBOLDT-LOVELOCK IRRIGATION, LIGHT & POWER CO.'S FEEDER CANAL NEAR MILL CITY, NEV.

LOCATION.—In SW. ¼ sec. 29, T. 33 N., R. 35 E., a quarter of a mile below head of canal and 2 miles north of Mill City, Pershing County.

RECORDS AVAILABLE.—February 19, 1914, to September 30, 1920.

GAGE.—Stevens continuous water-stage recorder on left bank; inspected by William Jacoby.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage or by wading.

CHANNEL AND CONTROL.—Earth section. Control indefinite. Stage-discharge relation is affected by growth of aquatic plants and by the wash from several small gullies below the station.

ICE.—Stage-discharge relation seriously affected by ice.

DIVERSIONS.—None.

REGULATION.—Flow regulated by head gates one-fourth mile above station.

ACCURACY.—Stage-discharge relation assumed permanent, except as affected by ice November 18, 1918, to February 6, 1919. No discharge measurements of open water made since 1917. Rating curve for 1917 was well defined below 250 second-feet. Operation of water-stage recorder satisfactory during 1919 season but not during 1920 season. Record from recorder for 1920 season used only December 25 to January 8 and February 21–23. Occasional staff gage readings made during remainder of period of flow. No water in canal except November 17, 1918, to April 29, 1919, and December 13, 1919, to February 23, 1920. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph, or from readings of staff gage. Discharge for period of ice effect estimated from a study of temperature records and the flow of the Humboldt River near Oreana. For periods of no gage-height record discharge interpolated or estimated. Records poor because of uncertainty of rating.

Canal diverts from Humboldt River in sec. 29, T. 33 N., R. 35 E., for storage in the Taylor-Pitt reservoirs near Humboldt. The water is returned to the river during the irrigation season, about 3 miles west of Humboldt through the Humboldt-Lovelock Irrigation, Light & Power Co.'s outlet canal and carried in the natural channel to the headgates of the canals serving the Lovelock district.

Discharge measurements of Humboldt-Lovelock Irrigation, Light & Power Co.'s feeder canal near Mill City, Nev., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 16	J. W. Bones	[a] 2.36	14.3	May 23	R. R. Rowe		0
Aug. 7	do		0	July 4	do		0
Oct. 20	do		0				

[a] Complete ice cover.

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Daily discharge, in second-feet, of Humboldt-Lovelock Irrigation, Light & Power Co.'s feeder canal near Mill City, Nev., for the years ending Sept. 30, 1919 and 1920.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1918-19.							16	0		14	57		110
1					98		17	3			78		109
2					84		18				75		67
3					20		19				71		2
4				30			20				85		2
5													
							21				101		1
6							22				96		1
7				33		0	23				74		1
8		10	12	35			24	10	10	25	84	0	1
9				37			25				86		.6
10				34	0								
							26				84		.5
11				34			27				89		.5
12				34			28				97		.4
13				31			29						.1
14				30		42	30						.0
15				40		87	31						

Day.	Dec.	Jan.	Feb.	Day.	Dec.	Jan.	Feb.	Day.	Dec.	Jan.	Feb.
1		50	33	15			18	25	51	72	
2		44	33								
3		48	32	16		54		26	52	68	
4		44	31	17				27	50	64	
5		44	30	18			20	28	50	60	
				19	40			29	50		
6		50	26	20		61		30	50	50	
7		47	23					31	50		
8		37		21		61	23				
9		48	23	22		61	17				
10				23		53	1				
		49		24		62	0				
11			33								
12	0										
13	8	50	26								
14	17	47									

NOTE.—No flow on days for which discharge is not given.

Monthly discharge of Humboldt-Lovelock Irrigation, Light & Power Co.'s feeder canal near Mill City, Nev., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	0	0	0	0
November		0	4.4	264
December			10.0	615
January			18.4	1,130
February	101		55.9	3,100
March	98	0	6.5	401
April	110	0	14.2	845
May	0	0	0	0
June	0	0	0	0
July	0	0	0	0
August	0	0	0	0
September	0	0	0	0
The year	110	0	8.8	6,360
1919-20.				
December 13-31			40.9	1,540
January			52.8	3,250
February 1-23			24.4	1,110
The year				5,900

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HUMBOLDT-LOVELOCK IRRIGATION, LIGHT & POWER CO.'S OUTLET CANAL NEAR HUMBOLDT, NEV.

LOCATION.—In SE. ¼ sec. 30, T. 32 N., R. 33 E., at outlet of lower Taylor-Pitt reservoir, 2½ miles west of Humboldt, Pershing County.

RECORDS AVAILABLE.—February 15, 1914, to September 30, 1920.

GAGE.—Stevens continuous water-stage recorder on right bank about 100 feet above the weirs; inspected by William Jacoby in 1919. Staff gage read by G. L. Pitt in 1920.

DISCHARGE MEASUREMENTS.—Made from a footbridge one-fourth mile below gage or by wading.

CHANNEL AND CONTROL.—Two 8-foot Cippoletti weirs form a permanent control. Stage of zero flow at gage height 0.04 foot, determined April 7, 1917.

ICE.—Gates usually closed during winter.

DIVERSIONS.—None.

REGULATION.—Flow regulated by reservoir outlet gates a few hundred feet above station.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 150 second-feet. Operation of water-stage recorder satisfactory during period when reservoir gates were open June 14 to July 11, 1919, except July 6–11. Staff gage read to hundredths twice a day when reservoir gates were open May 13–20, 1920. Daily discharge ascertained by applying to rating table the daily mean gage height determined from recorder graph, for 1919, and by averaging two daily readings for 1920. July 6–11 mean discharge estimated. Records good.

Canal conducts stored water released from the Taylor-Pitt reservoirs to Humboldt River in SW. ¼ sec. 31, T. 33 N., R. 33 E., for irrigation use in Lovelock Valley several miles downstream.

The station was visited by J. W. Bones on April 9, August 7, and October 20, 1919, and by R. R. Rowe on May 23 and July 4, 1920; canal dry each time.

Daily discharge, in second-feet, of Humboldt-Lovelock Irrigation, Light & Power Co.'s outlet canal near Humboldt, Nev., for the years ending Sept. 30, 1919 and 1920.

Day.	May.	June.	July.	Day.	May.	June.	July.	Day.	May.	June.	July.
1919.				1919.				1920.			
1			73	16		38		12	0		
2			72	17		38		13	38		
3			73	18		40		14	107		
4			72	19		43		15	111		
5			71	20		46					
								16	112		
6				21		47		17	112		
7				22		57		18	109		
8				23		57		19	110		
9			30	24		51					
10				25		47		20	68		
								21	0		
11				26		37					
12			0	27		35					
13		0		28		38					
14		17		29		47					
15		39		30		54					
				31							

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Monthly discharge of Humboldt-Lovelock Irrigation, Light & Power Co.'s outlet canal near Humboldt, Nev., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919.				
June 14-30	57	0	43.0	1,450
July 1-11	73	0	49.2	1,070
The year				2,520
1920.				
May 13-20	112	0	95.9	1,520
The year				1,520

NOTE.—Canal dry except during periods for which discharge is given.

PYRAMID AND WINNEMUCCA LAKES BASIN.

LAKE TAHOE AT TAHOE, CALIF.

LOCATION.—In SE. ¼ sec. 6, T. 15 N., R. 17 E., near outlet of lake at Tahoe, Placer County.

DRAINAGE AREA.—519 square miles (including water surface of lake, 193 square miles).

RECORDS AVAILABLE.—1900 to September 30, 1920.

GAGE.—Vertical staff fastened to piling of boat landing near outlet; read once a day by an employee of the United States Reclamation Service. Datum is 6,220 feet above sea level. Mean low-water elevation of lake is 6,226.0 feet.

EXTREMES OF STAGE.—Maximum stage recorded during year ending September 30, 1919, 8.06 feet June 8 and 9; minimum stage, 6.17 feet February 6.

Maximum stage recorded during year ending September 30, 1920, 6.09 feet, October 1; minimum stage, 4.71 feet September 30.

1900–1920: Maximum stage receorded, 11.26 feet July 14, 15, 17, and 18, 1907; minimum stage, 4.68 feet December 19–21, 1913.

ACCURACY.—Gage read to hundredths once daily; not read when water surface is rough.

COOPERATION.—Record furnished by United States Reclamation Service.

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Daily gage height, in feet, of Lake Tahoe at Tahoe, Calif., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July	Aug.	Sept.
1918–19.												
1	7.28	7.00	6.70	6.39	6.20	6.86	6.85	7.25	8.03	7.84	7.37	6.78
2	7.28	6.98	6.69	6.37	6.21	6.88	6.86	7.27	8.04	7.83	7.33	6.77
3	7.30	6.96	6.68	6.36	6.21	6.90	6.86	7.31	8.04	7.81	7.30	6.73
4	7.30	6.99	6.67	6.34	6.19	6.90	6.87	7.34	8.04	7.80	7.28	6.69
5	7.29	6.97	6.66	6.33	6.18	6.90	6.87	7.37	8.05	7.78	7.26	6.66
6	7.28	6.95	6.64	6.32	6.17	6.90	6.88	7.40	8.05	7.76	7.24	6.63
7	7.26	6.93	6.63	6.31	6.26	6.94	6.87	7.43	8.05	7.73	7.22	6.60
8	7.25	6.91	6.62	6.28	6.27	6.92	6.89	7.45	8.06	7.72	7.20	6.57
9	7.24	6.89	6.66	6.27	6.38	6.90	6.91	7.47	8.06	7.72	7.18	6.53
10	7.24	6.87	6.65	6.26	6.52	6.89	6.94	7.49	8.04	7.71	7.16	6.49
11	7.23	6.85	6.65	6.26	6.69	6.88	6.97	7.52	8.03	7.70	7.12	6.45
12	7.22	6.83	6.65	6.25	6.70	6.87	6.98	7.54	8.02	7.69	7.10	6.43
13	7.21	6.81	6.64	6.24	6.71	6.90	6.98	7.56	8.01	7.69	7.10	6.41
14	7.20	6.80	6.62	6.23	6.71	6.94	6.98	7.59	8.00	7.68	7.08	6.40
15	7.22	6.84	6.61	6.21	6.71	6.94	6.98	7.61	7.99	7.68	7.06	6.39
16	7.24	6.84	6.60	6.19	6.72	6.94	6.98	7.63	7.99	7.67	7.04	6.37
17	7.24	6.83	6.58	6.18	6.74	6.92	6.99	7.65	7.98	7.66	7.03	6.34
18	7.22	6.82	6.56	6.17	6.73	6.90	6.99	7.67	7.98	7.65	7.01	6.32
19	7.20	6.81	6.55	6.17	6.69	6.88	7.00	7.69	7.98	7.65	7.00	6.30
20	7.17	6.80	6.54	6.28	6.70	6.88	7.01	7.71	7.98	7.62	6.99	6.28
21	7.15	6.78	6.55	6.29	6.70	6.87	7.03	7.73	7.97	7.61	6.98	6.26
22	7.13	6.78	6.53	6.28	6.74	6.86	7.05	7.75	7.97	7.60	6.97	6.26
23	7.11	6.78	6.51	6.27	6.80	6.85	7.08	7.78	7.97	7.59	6.96	6.25
24	7.09	6.84	6.49	6.25	6.81	6.86	7.10	7.81	7.96	7.57	6.95	6.23
25	7.08	6.84	6.47	6.24	6.80	6.86	7.12	7.84	7.94	7.55	6.94	6.22
26	7.06	6.82	6.46	6.23	6.85	6.86	7.14	7.87	7.94	7.53	6.91	6.20
27	7.06	6.79	6.44	6.22	6.86	6.85	7.16	7.89	7.92	7.52	6.88	6.17
28	7.05	6.75	6.43	6.22	6.86	6.85	7.18	7.92	7.90	7.49	6.86	6.14
29	7.05	6.73	6.42	6.21	.....	6.85	7.21	7.96	7.88	7.46	6.84	6.12
30	7.04	6.71	6.41	6.21	.....	6.85	7.23	7.99	7.86	7.43	6.83	6.10
31	7.02	.....	6.40	6.20	.....	6.85	.....	8.02	.....	7.40	6.80	.....
1919–20.												
1	6.09	5.50	5.15	5.30	5.07	5.00	5.11	5.31	5.78	5.98	5.66	5.22
2	6.07	5.48	5.26	5.28	5.07	5.03	5.11	5.31	5.76	6.00	5.64	5.20
3	6.05	5.46	5.36	5.26	5.06	5.05	5.10	5.32	5.77	6.00	5.63	5.19
4	6.03	5.44	5.37	5.25	5.06	5.04	5.09	5.33	5.77	5.99	5.62	5.18
5	6.01	5.41	5.37	5.26	5.06	5.04	5.09	5.34	5.78	5.99	5.61	5.16
6	5.99	5.39	5.36	5.26	5.05	5.03	5.09	5.35	5.78	5.98	5.60	5.14
7	5.98	5.39	5.35	5.24	5.04	5.02	5.08	5.37	5.79	5.97	5.57	5.12
8	5.97	5.38	5.35	5.23	5.03	5.01	5.07	5.37	5.80	5.97	5.56	5.11
9	5.95	5.36	5.37	5.21	5.01	5.00	5.10	5.38	5.81	5.97	5.55	5.09
10	5.94	5.35	5.37	5.19	5.00	5.02	5.15	5.39	5.81	5.97	5.53	5.07
11	5.92	5.34	5.43	5.17	4.99	5.02	5.16	5.40	5.82	5.97	5.51	5.05
12	5.90	5.33	5.46	5.15	4.98	5.02	5.16	5.41	5.83	5.96	5.50	5.03
13	5.87	5.32	5.46	5.13	4.98	5.02	5.16	5.43	5.83	5.94	5.49	5.00
14	5.85	5.30	5.45	5.12	4.98	5.04	5.17	5.45	5.83	5.92	5.48	4.98
15	5.83	5.28	5.45	5.12	4.98	5.05	5.20	5.47	5.84	5.91	5.46	4.97
16	5.83	5.27	5.45	5.11	4.99	5.07	5.33	5.49	5.85	5.89	5.45	4.96
17	5.82	5.26	5.44	5.11	4.99	5.07	5.33	5.51	5.85	5.87	5.44	4.96
18	5.80	5.26	5.44	5.10	4.98	5.07	5.31	5.53	5.86	5.85	5.42	4.95
19	5.78	5.25	5.44	5.10	4.98	5.06	5.30	5.56	5.87	5.83	5.40	4.92
20	5.75	5.25	5.44	5.08	4.99	5.06	5.30	5.59	5.89	5.81	5.38	4.89
21	5.73	5.23	5.43	5.07	4.99	5.08	5.30	5.62	5.90	5.79	5.36	4.86
22	5.71	5.20	5.43	5.10	4.99	5.09	5.29	5.64	5.90	5.77	5.34	4.83
23	5.68	5.19	5.42	5.11	4.99	5.09	5.28	5.66	5.89	5.76	5.33	4.81
24	5.66	5.18	5.40	5.11	5.01	5.07	5.29	5.66	5.88	5.74	5.31	4.80
25	5.63	5.18	5.38	5.11	5.01	5.07	5.29	5.67	5.88	5.72	5.31	4.77
26	5.61	5.17	5.36	5.10	4.99	5.12	5.30	5.68	5.88	5.70	5.30	4.75
27	5.60	5.14	5.34	5.09	5.00	5.13	5.31	5.69	5.92	5.70	5.29	4.74
28	5.59	5.13	5.33	5.08	4.99	5.13	5.32	5.70	5.94	5.69	5.28	4.74
29	5.57	5.10	5.33	5.08	4.98	5.13	5.32	5.72	5.97	5.69	5.28	4.73
30	5.54	5.10	5.32	5.07	.....	5.12	5.32	5.74	5.98	5.68	5.27	4.71
31	5.52	.....	5.31	5.07	.....	5.11	.....	5.76	.....	5.67	5.24	.....

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TRUCKEE RIVER AT TAHOE, CALIF.

LOCATION.—In NW. ¼ sec. 7, T. 15 N., R. 17 E., at Tahoe, Placer County, a short distance below dam at outlet of Lake Tahoe.

DRAINAGE AREA.—519 square miles.

RECORDS AVAILABLE.—July 3, 1895, to February 29, 1896; June 17, 1900, to September 30, 1920.

GAGE.—Vertical staff fastened to a large cottonwood tree on left bank, 300 feet below dam at outlet of Lake Tahoe. Original gage, 100 feet above, was destroyed by dredging operations July 15, 1912.

DISCHARGE MEASUREMENTS.—Made from cable 140 feet below gage or by wading.

CHANNEL AND CONTROL.—Gravel; practically permanent.

EXTREMES OF DISCHARGE.—1895–1896 and 1900–1920: Maximum mean daily discharge, 1,340 second-feet July, 13–20, 1907 (stage, 4.3 feet); river dry during parts of 1900, 1901, 1914, 1918, 1919, and 1920.

ICE.—Stage-discharge relation not seriously affected by ice.

DIVERSIONS.—No information.

REGULATION.—Flow regulated by operation of gates in dam at Lake Tahoe.

ACCURACY.—Stage-discharge relation not permanent. Rating curve well defined. Gage read to hundredths at least once each day. Stage controlled by outlet gates at Lake Tahoe. Daily discharge ascertained by applying mean daily gage height to rating table.

COOPERATION.—Daily-discharge record and discharge measurements furnished by United States Reclamation Service which maintains the station in cooperation with Stone & Webster Engineering Corporation.

Discharge measurements of Truckee River at Tahoe, Calif., during the years ending Sept. 30, 1919 and 1920.

[Made by United States Reclamation Service.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1919.	*Feet.*	*Sec.-ft.*	1920.	*Feet.*	*Sec.-ft.*
June 13	1.00	10	Aug. 5	3.20	457
Oct. 14	2.80	322	6	3.29	487
14	2.14	154	9	3.39	519
14	2.67	289	31	2.96	382
14	2.89	355	Sept. 15	2.53	261

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Daily discharge, in second-feet, of Truckee River at Tahoe, Calif., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	June.	July.	Aug.	Sept.
1918-19.											
1	273	294	285	336	253	253	.....	.....	625	558	451
2	144	291	285	336	253	186	.....	.....	362	554	451
3	242	291	259	332	253	186	.....	.....	362	546	451
4	242	291	259	332	253	199	.....	.....	362	542	451
5	242	291	234	332	253	253	.....	.....	470	538	496
6	242	291	234	332	253	253	.....	.....	470	569	516
7	242	291	234	332	253	253	.....	.....	470	562	496
8	157	288	234	332	199	379	.....	.....	470	564	444
9	151	288	234	329	204	379	.....	.....	466	546	426
10	174	288	273	329	209	379	.....	.....	466	546	419
11	204	288	297	329	217	282	.....	.....	466	546	411
12	204	288	297	329	217	282	.....	.....	466	546	423
13	267	239	234	329	217	282	.....	45	463	546	419
14	267	264	234	329	217	282	.....	122	463	542	411
15	204	264	234	329	217	282	.....	186	463	542	433
16	151	264	253	329	217	282	.....	126	459	538	433
17	223	264	253	329	217	282	.....	126	459	538	429
18	223	264	253	247	144	282	.....	126	459	538	429
19	223	264	253	244	144	282	.....	126	459	538	426
20	223	264	253	225	191	282	.....	126	455	535	423
21	223	239	253	225	191	282	.....	186	455	535	437
22	239	239	253	225	191	282	.....	186	481	535	437
23	322	239	253	256	199	282	.....	267	481	531	433
24	239	239	426	199	199	282	.....	508	481	531	433
25	239	239	426	225	199	207	.....	508	542	531	433
26	261	239	426	225	199	120	.....	508	542	527	423
27	297	264	336	225	253	51	.....	508	569	527	423
28	297	264	336	225	253	.....	.....	725	569	527	419
29	297	285	336	225	.....	.....	.....	725	569	523	415
30	297	285	336	225	.....	.....	.....	725	566	523	343
31	294	.....	336	253	.....	.....	.....	.....	562	451	.....
1919-20.											
1	342	387	304	326	284	248	71	.....	139	459	367
2	319	383	404	323	284	259	145	.....	164	455	361
3	319	383	356	320	281	275	179	.....	177	452	355
4	319	383	298	320	281	270	111	.....	177	445	352
5	319	381	298	320	281	270	29	.....	177	455	343
6	319	381	298	320	259	264	.....	.....	213	452	334
7	307	381	298	317	278	259	.....	.....	278	448	322
8	307	381	298	311	270	254	.....	.....	298	452	316
9	307	381	317	304	270	248	.....	.....	298	465	307
10	307	381	330	323	264	259	.....	.....	298	465	298
11	303	376	346	320	264	259	.....	.....	373	518	289
12	303	370	349	317	241	259	44	.....	373	518	275
13	300	363	349	311	241	259	.....	.....	373	515	260
14	300	373	349	303	241	264	.....	.....	373	515	249
15	326	373	275	303	241	267	.....	.....	383	504	244
16	326	363	275	298	243	295	.....	.....	408	500	244
17	336	363	135	298	243	281	.....	.....	441	494	241
18	336	363	213	292	241	281	.....	.....	441	483	235
19	333	356	275	292	241	275	.....	.....	441	469	228
20	330	356	275	286	243	275	.....	.....	441	459	220
21	330	339	307	281	243	190	.....	.....	441	448	207
22	330	323	307	292	243	190	.....	128	437	437	190
23	323	326	307	295	243	213	.....	186	437	430	193
24	336	320	307	295	251	213	.....	186	434	427	190
25	343	320	304	295	251	213	.....	186	449	434	179
26	356	314	304	292	243	225	.....	186	449	420	176
27	356	298	304	289	248	246	.....	188	476	413	174
28	356	292	320	286	243	246	.....	188	476	399	174
29	353	278	320	286	238	246	.....	138	476	395	169
30	353	278	330	284	.....	246	.....	128	476	376	163
31	387	.....	330	284	.....	147	.....	.....	472	367	.....

NOTE.—Outlet gate closed Mar. 28 to June 12, 1919, and Apr. 6–11, Apr. 13 to June 21, 1920; no flow in river.

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Monthly discharge of Truckee River at Tahoe, Calif., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	322	144	236	14,500
November	294	239	270	16,100
December	426	234	284	17,500
January	336	199	285	17,500
February	253	144	217	12,100
March	379	0	227	14,000
April	0	0	0	0
May	0	0	0	0
June	725	0	194	11,500
July	625	362	482	29,600
August	569	451	538	33,100
September	516	343	434	25,800
The year	725	0	265	192,000
1919-20.				
October	387	300	328	20,200
November	387	278	352	20,900
December	404	135	306	18,800
January	326	281	303	18,600
February	284	238	255	14,700
March	295	147	248	15,200
April	179	0	19.3	1,150
May	0	0	0	0
June	188	0	50.5	3,000
July	476	139	364	22,400
August	518	367	454	27,900
September	367	163	255	15,200
The year	518	0	245	178,000

NOTE.—Monthly discharge computed by U. S. Geol. Survey.

TRUCKEE RIVER AT ICELAND, CALIF.

LOCATION.—In sec. 36, T. 18 N., R. 17 E., above dam of ice company, 400 feet northeast of Southern Pacific Railroad station at Iceland, Nevada County, and 23 miles west of Reno, Nev.

DRAINAGE AREA.—937 square miles.

RECORDS AVAILABLE.—August 1, 1912, to September 30, 1920.

GAGE.—Barrett & Lawrence water-stage recorder on right bank above dam; auxiliary vertical staff fastened to gage well.

DISCHARGE MEASUREMENTS.—Made from cable 130 feet above gage.

CHANNEL AND CONTROL.—Bed consists of small boulders; fairly smooth and permanent. Left bank high; right bank subject to overflow at high stages. Dam of National Ice Co. is the control.

EXTREMES OF DISCHARGE.—1907-1920: Maximum mean daily discharge, 15,300 second-feet March 18, 1907 (stage, 11.5 feet); minimum mean daily discharge reported, 310 second-feet December 10, 1908 (stage, 7.9 feet).

ICE.—Stage-discharge relation somewhat affected by ice.

DIVERSIONS.—No information.

REGULATION. See Truckee River at Tahoe (p. 245).

ACCURACY.—Stage-discharge relation did not change. No information regarding rating curves. Mean daily gage height determined from water-stage recorder sheets. Daily discharge ascertained by applying mean daily gage height to rating table.

COOPERATION.—Daily-discharge record and discharge measurements furnished by United States Reclamation Service, which maintains the station in cooperation with Stone & Webster Engineering Corporation.

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Discharge measurements of Truckee River at Iceland, Calif., during the years ending Sept. 30, 1919 and 1920.

[Made by United States Reclamation Service.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1919.	*Feet.*	*Sec.-ft.*	1919.	*Feet.*	*Sec.-ft.*	1920.	*Feet.*	*Sec.-ft.*
Apr. 24	3.82	3,230	June 18	1.25	531	May 28	2.36	1,240
24	3.65	2,980	Oct. 13	.87	383	July 28	1.19	505
May 16	2.95	1,820				Aug. 31	.96	422
June 7	2.06	951	1920.			Sept. 15	.65	313
7	1.95	902	May 14	2.56	1,440			

Daily discharge, in second-feet, of Truckee River at Iceland, Calif., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	476	412	408	489	399	476	1,120	4,370	1,070	825	617	530
2	379	412	446	516	399	476	1,340	4,370	995	626	617	510
3	566	404	446	516	391	476	1,600	4,370	995	559	600	550
4	1,050	416	446	516	391	455	2,100	3,650	925	542	586	550
5	614	424	446	529	399	476	2,240	3,320	715	581	595	518
6	639	433	420	494	399	498	1,660	2,920	855	577	617	550
7	590	454	408	467	433	498	1,270	2,650	855	572	617	510
8	498	454	399	459	420	476	1,160	2,480	767	550	617	550
9	511	454	387	450	454	566	1,120	2,400	705	572	617	502
10	399	454	371	450	614	580	1,440	2,100	705	595	617	502
11	446	454	442	450	614	498	2,030	2,030	595	608	617	502
12	412	454	442	502	576	489	2,030	2,100	530	608	600	502
13	391	399	467	472	543	498	1,660	2,030	498	618	590	490
14	433	433	395	450	516	507	1,440	2,030	470	618	595	490
15	446	454	399	459	489	498	1,550	2,030	510	640	590	498
16	543	433	425	463	454	498	1,780	1,780	617	604	617	502
17	476	433	412	463	446	498	2,170	1,660	550	586	617	502
18	476	442	404	358	412	498	3,220	1,600	518	577	600	470
19	454	446	416	425	399	529	3,020	1,660	510	581	595	470
20	420	433	420	425	467	520	2,830	1,600	498	581	595	478
21	412	412	420	379	433	529	2,650	1,900	498	586	600	514
22	391	412	420	375	454	529	2,650	2,030	530	586	595	518
23	412	412	404	412	442	548	2,650	2,030	510	572	590	518
24	412	442	566	433	391	614	3,020	1,960	550	572	590	518
25	412	412	576	412	412	629	2,830	1,780	690	559	590	522
26	391	399	619	399	412	614	2,400	1,720	730	572	577	522
27	399	433	534	387	433	614	2,240	1,780	825	626	586	522
28	408	391	489	412	498	717	2,400	1,900	825	640	590	510
29	408	399	476	387	.....	773	3,020	1,900	825	631	586	530
30	408	420	446	375	.....	970	3,650	1,660	855	626	595	506
31	403	.....	489	391	.....	1,040	.....	1,440	.....	622	586	.....
1919–20.												
1	502	418	382	414	432	414	432	1,440	855	482	518	418
2	451	432	425	414	440	478	510	1,300	837	502	522	421
3	432	432	510	407	414	459	572	1,250	890	490	510	640
4	414	432	510	407	393	459	617	1,200	890	470	502	414
5	470	425	418	407	403	459	640	1,250	925	451	502	403
6	432	403	428	396	421	459	715	1,340	855	470	498	396
7	396	403	391	407	414	459	784	1,440	855	451	506	389
8	414	414	425	414	410	470	784	1,550	925	490	502	389
9	414	414	410	414	410	470	740	1,550	890	482	498	382
10	407	414	407	451	407	459	631	1,300	784	470	518	376
11	407	414	478	432	403	459	631	1,300	730	470	563	372
12	400	414	470	432	393	432	572	1,300	690	510	577	362
13	396	414	455	432	386	510	795	1,310	665	510	559	343
14	386	414	455	414	386	538	740	1,340	595	506	538	330
15	386	418	510	432	386	510	795	1,500	609	490	538	304
16	386	425	498	396	386	502	855	1,660	690	510	538	298
17	386	432	498	389	386	502	740	1,720	586	530	534	304
18	386	432	498	389	385	478	740	1,880	550	510	518	298
19	389	451	410	403	376	510	795	2,030	538	502	514	285
20	391	432	407	403	365	530	825	1,960	538	510	510	285
21	407	410	410	396	346	595	767	2,030	538	510	490	279
22	403	407	410	421	356	510	767	1,780	470	498	478	269
23	391	414	410	414	362	478	740	1,600	510	506	470	260
24	379	421	403	396	362	510	715	1,300	538	486	470	260
25	391	410	403	403	356	518	740	1,040	518	494	490	260
26	400	410	396	414	346	510	855	1,080	518	510	478	247
27	403	389	463	414	346	510	1,040	1,080	538	510	478	240
28	403	389	403	403	362	510	1,250	1,200	510	510	455	240
29	421	382	414	403	362	510	1,550	1,200	631	506	440	234
30	403	376	407	407	.....	510	1,390	1,200	510	502	432	222
.....	410	.....	410	425	.....	530	.....	1,080	.....	510	428	.....

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nthly discharge of Truckee River at Iceland, Calif., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
ober	1,050	379	473	29,100
vember	454	391	428	25,500
cember	619	371	446	27,400
nuary	529	358	442	27,200
bruary	614	391	453	25,200
rch	1,040	455	567	34,900
ril	3,650	1,120	2,140	127,000
y	4,370	1,440	2,300	141,000
ne	1,070	470	691	41,100
ly	825	542	600	36,900
ugust	617	577	600	36,900
ptember	550	470	512	30,500
The year	4,370	358	806	583,000
1919-20.				
etober	502	379	408	25,100
ovember	451	376	415	24,700
ecember	510	382	434	26,700
anuary	451	389	411	25,300
ebruary	440	346	386	22,200
arch	595	414	492	30,300
pril	1,550	432	791	47,100
ay	2,030	1,040	1,430	87,900
une	925	470	673	40,000
uly	530	451	495	30,400
ugust	577	428	502	30,900
eptember	640	222	330	19,600
The year	2,030	222	565	410,000

NOTE.—Monthly discharge computed by U. S. Geol. Survey.

TRUCKEE RIVER AT RENO, NEV.

LOCATION.—In sec. 11, T. 19 N., R. 19 E., at Virginia Street bridge in Reno, Washoe County, 6 miles above mouth of Steamboat Creek and 12 miles below Nevada-California boundary.

DRAINAGE AREA.—1,070 square miles (measured on topographic maps).

RECORDS AVAILABLE.—July 1, 1906, to September 30, 1919, when station was discontinued.

GAGE.—Vertical staff fastened to retaining wall on left bank about 20 feet below the bridge; datum 4,481.60 feet above sea level.

DISCHARGE MEASUREMENTS.—Made from the Rock Street bridge 800 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; slightly shifting. River confined by retaining walls.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year. 4.7 feet on May 1 (discharge, 4,060 second-feet); minimum stage, 0.7 foot September 5, 9-16, and 20 (discharge. 97 second-feet).

1906-1919; Maximum stage recorded, 8.2 feet March 18, 1907 (discharge, 14,600 second-feet); minimum stage −0.1 foot July 2 and 3, 1912 (discharge, 18 second-feet).

ICE.—Stage-discharge relation slightly affected by ice during some winters.

DIVERSIONS.—Numerous diversions for Truckee Valley above and below station. Some water is diverted around gage for power purposes in Reno.

REGULATION.—Flow affected somewhat by the operation of several power plants above the station, by storage at Lake Tahoe, and by the irrigation diversions for Truckee Valley.

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ACCURACY.—Stage-discharge relation changed during high water in April. Rating curve used October 1, to April 18, well defined between 150 and 2,000 second-feet; curve used May 1 to September 30 well defined between 100 and 5,000 second-feet. Change assumed April 19–30. Gage read to tenths once a day. Daily discharge ascertained by applying daily gage height to rating table. Shifting-control method used April 19–30. Records good. Difference between gage reading furnished by observer of Weather Bureau and reading by engineer of United States Geological Survey on January 7 at time of discharge measurement is not explained. It may be due to diurnal fluctuation.

COOPERATION.—Gage-height record furnished by United States Weather Bureau.

Discharge measurements of Truckee River at Reno, Nev., during the period Oct. 1, 1918, to May 28, 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 7	J. W. Bones	1.84	532	Jan. 12	J. W. Bones	1.65	472
Apr. 10	do	2.78	1,240	May 28	R. R. Rowe	2.40	876
Aug. 9	do	.96	173				

Daily discharge, in second-feet, of Truckee River at Reno, Nev., for the year ending Sept. 30, 1919.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	260	260	350	400	350	303	1,260	4,060	1,090	510	188	155
2	220	220	400	400	350	308	1,450	3,860	930	351	155	125
3	184	184	350	400	303	450	1,550	3,860	850	306	155	125
4	303	350	303	400	350	350	1,990	3,670	630	263	155	224
5	930	303	303	400	303	400	2,510	3,670	510	188	188	97
6	450	303	303	400	303	400	1,870	3,130	510	224	155	125
7	400	260	260	350	400	400	1,350	2,800	400	306	155	125
8	350	260	260	350	450	450	1,260	2,500	400	306	155	155
9	350	260	260	350	450	570	1,090	2,100	351	306	172	97
10	350	260	260	350	450	450	1,350	2,100	305	305	188	97
11	184	260	260	350	780	400	1,760	2,100	263	305	188	97
12	220	260	260	303	570	400	1,990	1,980	263	263	155	97
13	260	303	400	308	510	450	1,550	1,860	224	263	155	97
14	220	220	350	303	450	400	1,350	1,860	188	306	155	97
15	220	308	350	303	450	400	1,350	1,860	263	351	155	97
16	303	260	303	350	450	400	1,870	1,750	263	263	155	97
17	303	260	260	350	400	400	2,110	1,640	263	224	155	125
18	350	260	260	350	400	450	3,150	1,640	224	263	155	125
19	260	303	260	303	303	450	3,320	1,640	155	263	125	155
20	260	303	303	450	303	450	3,160	1,640	155	263	125	97
21	260	303	303	303	303	450	2,850	1,750	125	263	.155	125
22	220	303	303	303	308	400	3,010	1,980	155	305	155	125
23	184	260	303	308	350	450	3,030	2,100	155	263	155	125
24	260	303	303	308	308	570	3,580	1,980	155	351	155	155
25	303	303	510	303	303	640	3,390	1,750	351	263	125	125
26	184	260	510	308	350	640	2,590	1,640	400	263	125	125
27	220	260	400	303	350	640	2,600	1,540	453	263	125	125
28	220	260	400	260	350	570	2,460	1,860	510	224	155	125
29	220	220	400	303	.....	710	3,100	1,860	570	263	125	263
30	220	360	460	260	.....	850	3,680	1,546	570	263	155	305
31	220	.....	400	260	.....	1,170	.....	1,350	.....	224	155	.....

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Monthly discharge of Truckee River at Reno, Nev., for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	930	184	287	17,600
November	350	184	274	16,300
December	510	260	332	20,400
January	450	260	334	20,500
February	780	303	391	21,700
March	1,170	303	496	30,500
April	3,650	1,090	2,250	134,000
May	4,060	1,350	2,230	137,000
June	1,090	125	389	23,100
July	510	188	283	17,400
August	188	125	154	9,470
September	305	97	134	7,970
The year	4,060	97	630	456,000

HONEY LAKE BASIN.

LONG VALLEY CREEK NEAR SCOTTS, CALIF.

LOCATION.—At dam site 1 mile below Scotts, Lassen County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 10, 1917, to September 30, 1919 (discharge measurements only for 1918).

GAGE.—Inclined staff in two sections on right bank.

DISCHARGE MEASUREMENTS.—Made from cable 30 feet above gage or by wading.

CHANNEL AND CONTROL.—Sand, shifts badly.

ICE.—No information.

DIVERSIONS.—No information.

REGULATION.—No information.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve used. Gage read to half-tenths once or twice daily. Daily discharge ascertained by shifting-control method. Records fair. Estimates of monthly discharge have not been determined because of incomplete record.

Discharge measurements of Long Valley Creek near Scotts, Calif., during the year ending Sept. 30, 1919.

[Made by T. G. Bedford.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Mar. 5	3.39	17	Apr. 17	3.63	49	July 6	3.21	.04
Apr. 16	3.57	42	May 15	3.44	5.2			

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Daily discharge, in second-feet, of Long Valley Creek near Scotts, Calif., for the year ending Sept. 30, 1919.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	.....	3	18	.....	50	1.5	16	.....	.....	18	46	6	.....
2	.....	3	18	.....	43	.....	17	3	13	46	49	4	.....
3	.....	.....	.....	.....	48	.....	18	.....	.....	30	62	4	.....
4	.....	.....	18	.....	54	.....	19	.....	9	30	.....	4	.....
5	.....	6	18	.....	49	1	20	.....	.....	46	61	4	.....
6	.....	.....	30	.....	39	.....	21	3	9	46	42	4	.....
7	.....	9	.....	.....	30	.....	22	.....	.....	64	42	4	.....
8	.....	.....	18	.....	28	.....	23	.....	.....	84	41	4	.....
9	.....	.....	18	.....	21	.....	24	.....	3	64	40	4	.....
10	.....	.....	9	.....	20	.....	25	.5	.....	84	40	4	.....
11	.....	18	.....	.....	14	.....	26	.....	.....	84	39	4	.....
12	.....	.....	30	.....	13	.....	27	.....	9	105	38	4	.....
13	.....	13	18	.....	12	.....	28	.1	.....	64	38	4	.....
14	.....	.....	18	.....	11	.....	29	.....	.....	105	71	3	.....
15	.....	.....	9	46	9	.....	30	.....	.....	64	58	3	.....
							31	.....	.....	84	.....	3	.....

NOTE.—No record Oct. 1 to Jan. 16 and July 7 to Sept. 30; stream probably dry. Stream was practically dry June 6 to July 6. No record Apr. 1-14.

SUSAN RIVER AT SUSANVILLE, CALIF.

LOCATION.—Three-fourths of a mile southwest of Susanville, Lassen County, 2 miles above Piute Creek, and 3½ miles below Cheney Creek.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 3, 1900, to December 31, 1905; March 10 to May 31, 1913; February 8, 1917, to September 30, 1920.

GAGE.—Inclined staff gage attached to an alder tree on right bank below the old electric light plant. Datum lowered 2 feet December 20, 1903. September 21, 1919, station was moved upstream just above the old electric light plant and the gage installed at an independent datum. Gage is in three sections; first section vertical, attached to a willow stump on right bank 150 feet above electric light plant; second section inclined, attached to left cable tower; third section vertical, attached to left cable tower. Gages read by F. W. Hutchinson.

DISCHARGE MEASUREMENTS.—Made from cables at the gages or by wading.

CHANNEL AND CONTROL.—Gravel and cobblestones; practically permanent. Right bank high and covered with vegetation. Left bank low and covered with sparse growth of willows and will be overflowed.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 9.2 feet at 7 a. m. April 4 (discharge, 568 second-feet); minimum stage, 4.40 feet August 18-20, 26-27 (discharge, 2.0 second-feet).

Maximum stage recorded during year ending September 30, 1920, 3.6 feet at 5 p. m. April 15 (discharge, 1,000 second-feet); minimum stage, below 1.00 foot August 1-24 (discharge about 1.0 second-foot).

1900–1905, 1913, and 1917–1920: Maximum stage recorded, 9.9 feet February 22, 1904 (discharge, 1,750 second-feet); minimum stage, 4.35 feet at 7.30 p. m. August 10, 1918 (discharge, 0.8 second-foot).

DIVERSIONS.—Ramsey ditch diverts water from the old electric light plant flume which heads at the dam about 800 feet above the station, on the right bank. The electric light plant flume diverts water past the gage and spills back into the river just above the plant through a break in flume. Considerable water leaks from the flume and from Ramsey ditch into the river between point of diversion and the gage. There is also leakage from Ramsey ditch between old and new gages and some overflow from the Susanville waterworks.

REGULATION.—Probably none from the ditch.

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ACCURACY.—Stage-discharge relation did not change during the period. Rating curve for old station well defined between 2 and 800 second-feet; curve for new station well defined below 100 second-feet. Gage read to hundredths twice daily, sometimes oftener and the highest stage noted. Daily discharge ascertained by applying mean daily gage height to rating table except October 1, 1918, to February 8, 1919, when shifting-control method was used, and December 8, 1919, to January 21, 1920, when it was estimated because of ice. Flow at new location does not include water diverted by flume for electric light plant. Records good.

Discharge measurements of Susan River at Susanville, Calif., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Dec. 21	T. G. Bedford	4.93	9.9	Sept. 21	T. G. Bedford	4.55	3.9
1919.				21	do	[a] 1.15	3.2
Mar. 5	do	5.33	29	21	do	1.08	2.3
Apr. 18	do	7.96	266	21	do	1.24	7.1
May 16	do	6.05	77	1920.			
July 7	do	6.42	100	Aug. 2	K. M. Kelley	.99	1.2

[a] Station moved upstream to new location; gage installed at an independent datum.

Daily discharge, in second-feet, of Susan River at Susanville, Calif., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	11	11	11	12	13	21	300	266	37	98	8.0	2.6
2	32	11	11	12	11	40	300	236	35	98	4.6	2.9
3	28	11	10	12	10	40	338	222	33	96	4.2	3.0
4	15	12	13	12	11	38	542	208	30	102	4.2	3.0
5	11	14	13	12	12	29	378	183	23	106	3.8	3.0
6	15	14	13	12	16	28	236	159	40	106	3.5	3.1
7	14	14	13	12	66	26	208	144	85	106	3.0	4.2
8	11	14	13	12	81	25	183	129	81	102	3.0	5.3
9	10	13	13	12	422	24	171	120	85	102	2.8	4.3
10	9.5	13	9.0	12	102	26	236	111	106	28	2.5	4.2
11	10	13	9.0	12	81	24	266	102	106	9.5	2.4	3.2
12	9.0	14	11	12	62	22	266	98	111	6.5	2.2	2.5
13	9.0	14	12	12	42	24	222	93	111	4.0	2.2	2.5
14	8.5	14	12	12	38	26	195	89	106	27	2.2	2.9
15	12	29	9.0	12	33	23	195	85	106	81	2.2	3.4
16	28	21	9.0	12	32	26	208	77	102	85	2.2	3.0
17	16	18	8.5	12	27	34	236	68	102	85	2.1	3.0
18	14	17	8.5	12	28	63	300	65	102	85	2.0	3.8
19	14	17	8.0	12	28	61	300	65	102	81	2.0	3.3
20	13	16	5.5	14	29	62	282	69	102	77	2.0	3.2
21	11	13	4.5	17	28	106	266	69	102	93	2.5	.....
22	11	14	6.0	16	24	149	266	68	98	85	3.0	.....
23	11	15	9.0	34	24	171	338	73	98	81	2.8	.....
24	11	18	11	21	24	195	338	66	93	73	2.4	.....
25	11	16	12	13	23	222	338	61	93	56	2.3	.....
26	11	16	12	14	21	236	266	57	93	36	2.0	.....
27	11	13	12	12	22	222	250	52	93	31	2.0	.....
28	9.5	11	12	12	20	116	266	47	93	26	2.1	.....
29	9.0	10	12	13	.....	300	266	48	98	24	2.5	.....
30	10	9.5	12	14	.....	358	266	47	98	22	2.5	.....
31	11	.....	12	14	.....	318	.....	43	.....	14	2.5	.....

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Daily discharge, in second-feet, of Susan River at Susanville, Calif., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	8.5	8	8.5	.....	14	20	46	132	26	14	1.2	2.3
2	8.5	8	8.5	.....	14	22	55	121	22	14	1.2	1.8
3	7	8	9	.....	14	17	50	82	20	13	.....	1.4
4	6.5	8	8.5	.....	15	16	50	86	19	12	.....	1.4
5	7	8.5	8	.....	15	23	59	80	17	8.5	.....	1.4
6	8	8.5	8.5	.....	14	22	93	86	14	7.5	.....	1.6
7	8	9	9.5	.....	13	22	106	93	34	6.5	.....	1.6
8	6.5	8.5	.....	.....	12	25	93	96	66	4.8	.....	1.4
9	6	8.5	.....	.....	11	30	66	106	74	3.9	.....	1.6
10	6.5	8.5	.....	.....	11	24	63	102	80	2.2	.....	1.6
11	8	8.5	.....	.....	11	22	69	80	73	1.8	.....	1.3
12	8	8.5	.....	.....	11	23	73	82	72	1.6	.....	1.3
13	8	8.5	.....	.....	11	24	122	77	73	2.3	.....	1.6
14	8	8.5	.....	.....	11	46	106	80	74	2.5	.....	1.8
15	8	8	.....	.....	11	28	520	74	79	1.8	.....	2.1
16	8	8	.....	.....	12	28	167	73	82	2.3	.....	2.3
17	8	8	.....	.....	12	27	112	77	77	2.3	.....	2.5
18	8	9	.....	.....	9.5	28	106	79	79	2.3	.....	2.5
19	8	8.5	.....	.....	9	27	112	72	86	2.3	.....	2.5
20	8	8.5	.....	.....	11	29	104	67	86	2.0	.....	2.5
21	8	8.5	.....	.....	9	173	91	66	74	1.3	.....	2.5
22	8.5	8.5	.....	16	8	66	86	63	65	1.3	.....	2.5
23	8.5	8	.....	13	11	59	88	60	55	1.3	.....	8.5
24	8.5	8	.....	12	13	46	80	56	40	1.3	.....	8.5
25	7	8	.....	13	13	45	79	55	38	1.3	3.7	8.5
26	8	8	.....	13	13	50	86	52	40	1.3	4.4	8.5
27	8	8	.....	13	13	39	112	50	35	1.3	3.0	8.5
28	8	8	.....	14	13	36	125	45	28	1.3	2.1	8.5
29	8	8	.....	14	13	46	130	40	20	1.3	2.0	8.5
30	8	8	.....	14	.....	63	132	38	17	1.3	2.0	8.5
31	8	.....	.....	14	.....	52	.....	38	.....	1.3	2.1	.....

NOTE.—No record on old gage Sept. 21–30, 1919, discharge estimated as 4.5 second-feet. Control blocked with ice, Dec. 8, 1919, to Jan. 21, 1920; discharge estimated as 5 second-feet. Stage below 1.00 foot Aug. 3–24, 1920; discharge estimated 1.0 second-foot.

Monthly discharge of Susan River at Susanville, Calif., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	32	8.5	13.1	805
November	29	9.5	14.5	863
December	13	4.5	10.5	646
January	34	12	13.6	836
February	422	10	47.5	2,649
March	358	21	98.6	6,060
April	542	171	274	16,300
May	266	43	104	6,390
June	111	23	85.5	5,090
July	106	4.0	65.4	4,020
August	8	2.0	2.83	174
September	.....	.....	3.72	221
The year	542	2.0	60.8	44,000
1919–20.				
October	8.5	6	7.77	478
November	9	8	8.28	493
December	.....	.....	5.82	358
January	.....	.....	7.8	479
February	15	8	12.0	690
March	173	16	38.0	2,340
April	520	46	106	6,310
May	132	38	74.5	4,580
June	86	14	52.1	3,100
July	14	1.3	3.93	242
August	4.4	.....	1.41	86.7
September	8.5	1.3	3.65	217
The year	520	.....	26.7	19,400

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BAXTER CREEK NEAR LASSEN,[1] CALIF.

LOCATION.—In NE. ¼ SW. ¼ sec. 32, T. 29 N., R. 13 E., 2½ miles northwest of Lassen, Lassen County, and 200 feet below highway bridge on county road at ranch of D. J. Sweeny.

RECORDS AVAILABLE.—February 17, 1913, to July 31, 1916, and December 20, 1917, to September 30, 1919, when station was discontinued.

GAGE.—Vertical staff in two sections on left bank; read by Jay Bass. Prior to March 21, 1915, gage was 400 feet above at an independent datum. Present gage was reconstructed December 20, 1917, and the datum raised 0.07 foot.

DISCHARGE MEASUREMENTS.—Made from footbridge or by wading.

CHANNEL AND CONTROL.—Bed consists of gravel, small boulders and sand; somewhat shifting. The artificial control, constructed in 1915, was effective at low water. High-water control consists of roots and brush and is fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from flood marks, 5.7 feet some time during March 1, 2, or 3 (discharge,128 second-feet); stream almost dry July 1 to September 30.

1913–1916, 1918–1919: Maximum stage recorded, 9.6 feet at 5 p. m. January 25, 1914 (discharge, 360 second-feet); stream almost dry during fall of 1915, 1918, and 1919.

ICE.—Stage-discharge relation affected by ice for short periods.

DIVERSIONS.—About 14 small ditches divert water in Baxter and Elysian valleys above gage. Most of this returns to creek by seepage and overflow.

REGULATION.—Diversions above regulate flow during irrigating season.

ACCURACY.—Stage-discharge relation changed March 2 when right bank was scoured out. Flow slightly affected by ice January 1–4. Rating curves well defined. Gage read to half-tenths once daily; readings May 4 to June 30 unreliable. Daily discharge ascertained by applying mean daily gage height to rating table, except January 1–4 and May 4 to June 30 which were estimated. Monthly discharge for July, August, and September estimated. Records fair.

Discharge measurements of Baxter Creek near Lassen, Calif., during the year ending Sept. 30, 1919.

[Made by T. G. Bedford.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Dec. 20	1.86	1.8	Apr. 17	2.20	8.5	July 7	1.25	0.01
Mar. 6	2.20	8.2	May 15	2.69	18.5	Sept. 20	1.28	.02
6	2.29	9.3	16	2.63	16.7			

[1] Formerly called Janesville.

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Monthly discharge, in second-feet, of Baxter Creek near Lassen, Calif., for the year ending Sept. 30, 1919.

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.
	0.3	0.4	0.4		0.8	37	6.0	33
	.3	.4	.6	0.3	.8	48	4.5	26
	.3	.6	.4		.8	39	3.9	28
	.3	.4	.4		.8	26	4.0	
	.3	.4	.4	.4	1.9	10	4.0	
	.4	.4	.4	.4	2.4	10	3.9	
	.6	.4	.4	.6	2.4	4.5	3.8	
	.4	.4	.6	.6	4.1	6.0	3.9	
	.6	.4	.6	.4	22	6.0	4.0	22
	.6	.4	.6	.3	36	8.0	3.9	
	1.1	.4	.6	.3	36	10	3.8	
	1.1	.4	.6	.4	22	12	3.8	
	.6	.4	.6	.4	13	14	6.0	
	.6	.4	.6	.6	4.1	12	4.5	
	1.1	.4	.6	.8	4.1	6.0	4.5	18
	1.1	.4	.6	9.0	4.1	10	3.9	17
	1.1	.4	.6	10	6.0	6.0	3.8	
	.6	.4	.6	13	6.0	8.0	4.0	
	.6	.4	.6	9.0	4.1	6.0	4.5	
	.4	.4	.6	8.5	4.1	6.0	26	
21	.4	.4	.6	7.0	4.1	4.5	28	
22	.3	.4	.6	6.0	6.0	3.9	26	
23	.3	.4	.6	5.5	22	8.0	33	
24	.4	.4	.6	4.8	36	8.0	33	13
25	.4	.4	.6	4.1	36	16	30	
26	.4	.4	.6	.6	36	6.0	28	
27	.4	.4	.6	.6	36	15	28	
28	.4	.4	.6	.8	22	8.0	30	
29	.4	.4	.6	.8	.....	4.5	26	
30	.4	.4	.6	.8	.....	8.0	30	
31	.4	.....	.6	.8	.....	10	.....	

NOTE.—Discharge, Jan. 1–4, estimated because of ice.
Braced figures show mean discharge for periods indicated.

Monthly discharge of Baxter Creek near Lassen, Calif., for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1.1	0.3	0.54	33.2
November	.6	.4	.41	24.4
December	.6	.4	.56	34.4
January	13	.3	2.83	174
February	36	.8	13.3	739
March	48	3.9	12.1	744
April	33	3.8	13.3	791
May	33	.....	18.0	1,110
June	.....	.....	4.0	238
July	.....	.....	a.01	.6
August	.....	.....	a.01	.6
September	.....	.....	a.02	1.2
The year	48	.....	5.38	3,890

a Estimated from current-meter measurements.

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SCHLOSS CREEK AT LASSEN,[1] CALIF.

LOCATION.—In SW. ¼ sec. 9, T. 28 N., R. 13 E., half a mile above road crossing at school house in Lassen, Lassen County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 22 to June 30, 1915, and December 21, 1917, to September 30, 1919, when station was discontinued.

GAGE.—Vertical staff on left bank; read by Gross and Wemple. Old gage used up to June 30, 1915, was 200 feet below present gage.

DISCHARGE MEASUREMENTS.—Made by wading at gage.

CHANNEL AND CONTROL.—Loose gravel.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.71 feet April 30, May 1 and 3 (discharge, 2.0 second-feet); stream dry October 1 to February 4 and June 6 to September 30.

ICE.—No flow during frozen season.

DIVERSIONS.—None above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined below 1 second-foot and extended above. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating table. Records fair.

Discharge measurements of Schloss Creek at Lassen, Calif., during the year ending September 30, 1919.

[Made by T. G. Bedford.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Dec. 20	.....	0	Apr. 17	1.57	0.56	May 15	1.60	0.92
Mar. 6	1.29	.02	18	1.61	.86	July 7	.....	0

Daily discharge, in second-feet, of Schloss Creek at Lassen, Calif., for the year ending September 30, 1919.

Day.	Feb.	Mar.	Apr.	May.	June.	Day.	Feb.	Mar.	Apr.	May.	June.
1	.....	0.2	1.2	2.0	0.05	16	0.1	0.01	0.8	0.8	.....
2	.....	1.9	1.4	1.9	.1	17	.1	.02	.6	1.0	.....
3	.....	.8	1.1	2.0	.05	18	.1	.02	.7	1.0	.....
4	.....	.3	1.4	1.9	.0	19	.1	.05	.7	1.1	.....
5	.....	.1	1.4	1.8	.03	20	.1	.02	.8	1.1	.....
6	.....	.0	1.2	1.7	.....	21	.1	.02	.8	1.0	.....
7	.....	.0	1.1	1.6	.....	22	.1	.03	.8	1.2	.....
8	.....	.01	.8	1.4	.....	23	.1	.05	1.0	1.0	.....
9	.....	.0	.9	1.4	.....	24	.1	.05	1.1	1.0	.....
10	.....	.0	.8	1.4	.....	25	.1	.1	1.0	1.0	.....
11	.....	.01	.9	1.4	.....	26	.1	.1	1.0	1.2	.....
12	.....	.02	.9	1.5	.....	27	.2	.1	1.4	1.4	.....
13	.....	.0	.8	1.2	.....	28	.2	.2	1.9	1.2	.....
14	.....	.0	.9	1.0	.....	29	.....	.3	1.9	.6	.....
15	0.1	.0	.8	.8	.....	30	.....	.8	2.0	.1	.....
						31	.....	1.1	.....	.1	.....

NOTE.—No flow except where given.

[1] Formerly called Janesville.

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Monthly discharge of Schloss Creek at Lassen, Calif., for the year ending September 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October			0	0
November			0	0
December			0	0
January			0	0
February	0.2	0	.05	3.2
March	1.9	0	.20	12.3
April	2.0	.6	1.07	63.7
May	2.0	.1	1.22	75.0
June	.1	0	.008	.5
July			0	0
August			0	0
September			0	0
The year	2.0	0	.214	155

JANESVILLE CREEK AT LASSEN,[1] CALIF.

LOCATION.—In SW. ¼ sec. 9, T. 28 N., R. 13 E., 40 feet above county road at Lassen, Lassen County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 3 to June 7, 1913, March 22 to June 30, 1915, and December 21, 1917, to September 30, 1919, when station was discontinued.

GAGE.—Vertical staff gage nailed to cottonwood tree on left bank, 40 feet above the road; read by Orlo Wemple. Gage used to June 30, 1915, was a staff gage nailed to a cottonwood tree on left bank 300 feet above present gage.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed of stream consists of sand and gravel. Control at low water consists of sand and gravel and is affected by leaves and débris. High-water control is the concrete culvert 40 feet below.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.30 feet at 5 p. m. February 10 (discharge, 10 second-feet); stream practically dry during September.

ICE.—Stage-discharge relation probably affected by ice.

DIVERSIONS.—A small diversion for municipal use at Lassen through a 3-inch pipe above the gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent except as affected by leaves and other débris lodging on control. Rating curve well defined below 5 second-feet. Gage read to hundredths once daily and oftener during high water. Daily discharge ascertained by applying mean daily gage height to rating table except October 1 to December 19, when leaves were on control; discharge estimated.

Discharge measurements of Janesville Creek at Lassen, Calif., during the year ending Sept. 30, 1919.

[Made by T. G. Bedford.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Dec. 20	1.72	0.26	Apr. 17	1.87	2.2	July 7	1.48	0.19
Mar. 6	1.72	.87	18	1.93	3.0	Sept. 20		0
7	1.70	.73	May 15	1.86	2.5			

[1] Formerly called Janesville.

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Daily discharge, in second-feet, of Janesville Creek at Lassen, Calif., for the year ending Sept. 30, 1919.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	.....	0.05	0.05	2.8	2.4	6.0	0.6
2	.....	.05	.05	6.0	2.8	5.6	.9
3	.....	.05	.05	4.2	3.1	6.0	.9
4	.....	.05	.1	1.7	4.2	5.1	.5
5	.....	.05	.1	.9	4.2	4.7	.8
6	.....	.05	.6	1.0	4.1	4.2	.8
7	.....	.05	1.8	1.0	3.5	3.8	.6
8	.....	.05	3.4	1.0	2.8	3.5	.6
9	.....	.05	3.8	1.0	2.8	3.5	.4
10	.....	.05	10	.9	3.1	3.6	.3
11	.....	.05	6.0	.9	3.5	3.6	.2
12	.....	.05	4.2	1.0	3.5	3.8	.1
13	.....	.05	3.2	1.0	3.1	3.6	.1
14	.....	.05	1.7	.9	2.9	3.5	.3
15	.....	.05	.9	.9	2.8	2.6	.3
16	.....	.05	.9	1.1	2.8	2.6	.3
17	.....	.05	.8	1.1	2.7	2.8	.3
18	.....	.05	.9	1.1	3.1	3.1	.3
19	.....	.05	.8	1.2	2.9	3.8	.2
20	0.3	.05	.8	1.3	2.9	3.8	.2
21	.2	.05	.9	1.3	3.1	3.9	.1
22	.2	.05	1.0	1.3	3.6	3.8	.1
23	.2	.05	.9	1.5	4.1	3.5	.1
24	.2	.05	.9	1.6	4.2	3.2	.1
25	.2	.05	1.0	1.7	3.9	3.4	.1
26	.2	.05	1.1	1.8	3.9	3.4	.1
27	.1	.05	1.1	1.8	4.2	3.6	.1
28	.1	.05	1.3	1.8	5.8	3.4	.1
29	.1	.05	.....	1.9	6.0	2.2	.1
30	.1	.05	.....	1.9	6.0	.9	.1
31	.1	.05	.....	2.1	.....	.8	.....

NOTE.—Discharge estimated Dec. 1-19, 0.10 second-foot.

Monthly discharge of Janesville Creek at Lassen, Calif., for the year ending Sept 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	.....	.....	[a] 0.05	3.1
November	.....	.....	[a] .10	6.0
December	.....	.....	.13	8.0
January	0.05	0.05	.05	3.1
February	10	.05	1.73	96.1
March	6	.9	1.60	98.4
April	6	2.4	3.60	214
May	6	.8	3.59	221
June	.9	.1	.32	19.0
July	.....	.....	[a] .2	12.3
August	.....	.....	[a] .1	6.1
September	.....	.....	[a] 0	0
The year	10	0	.949	687

[a] Estimated.

SURPRISE VALLEY.

BIDWELL CREEK NEAR FORT BIDWELL, CALIF.

LOCATION.—In sec. 19, T. 47 N., R. 16 E., 500 feet below second main forks of creek, at O'Conner's ranch, 7 miles north of Fort Bidwell, Modoc County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 13, 1917, to September 30, 1919, when station was discontinued. Discharge measurements only for 1919.

GAGE.—Vertical staff nailed to an 8-inch cottonwood tree on left bank 250 feet above ford, 500 feet below second main forks of creek.

DISCHARGE MEASUREMENTS.—Made by wading at the ford.

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CHANNEL AND CONTROL.—Large boulders 10 feet below gage which is in a pool, probably permanent.

DIVERSIONS.—None.

REGULATION.—None.

Discharge measurements of Bidwell Creek near Fort Bidwell, Calif., during the period Oct. 1, 1918, to Oct. 2, 1919.

[Made by T. G. Bedford.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1918.	*Feet.*	*Sec.-ft.*	1919.	*Feet.*	*Sec.-ft.*	1919.	*Feet.*	*Sec.-ft.*
Dec. 9	1.48	0.7	May 1	2.48	50	June 16	1.85	7.1
29	1.85	3.7	24	2.75	52	July 1	1.70	3.6
			June 4	2.11	27	Oct. 2	1.51	1.0

BIDWELL CREEK AT FORT BIDWELL, CALIF.[1]

LOCATION.—In NW. ¼ sec. 8, T. 46 N., R. 16 E., at Martin's Hot Springs, at mouth of canyon, 1 mile north of Fort Bidwell, Modoc County.

DRAINAGE AREA.—27 square miles.

RECORDS AVAILABLE.—November 3, 1911, to June 30, 1912, and December 13, 1917, to September 30, 1919, when station was discontinued.

GAGE.—Vertical staff nailed to a stump on right bank about 40 feet below a private culvert. Read by Fred M. Martin. Original gage at independent datum was a vertical staff spiked to a cottonwood tree 100 feet above present gage. Control not the same for the two gages.

DISCHARGE MEASUREMENT.—Made from culvert or by wading.

CHANNEL AND CONTROL.—Boulders and coarse gravel 50 feet below gage, fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.6 feet at 6 p. m. April 30 (discharge, 120 second-feet); minimum stage, 0.8 foot August 18 to September 6 and September 9–30 (discharge, 0.5 second-foot).

ICE.—Slightly affected by ice November 26 to March 13.

DIVERSIONS.[2]—Three small ditches divert above the gage and about ten or more small irrigation ditches divert within 1 mile below gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined. Gage read to hundredths once a day except during run-off from snow when read twice a day. Daily discharge ascertained by applying mean daily gage height to rating table except November 26 to March 13. (See footnote to daily-discharge table). Records good.

Discharge measurements of Bidwell Creek at Fort Bidwell, Calif., during the period Oct. 1, 1918, to Oct. 3, 1919.

[Made by T. G. Bedford.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1918.	*Feet.*	*Sec.-ft.*	1919.	*Feet.*	*Sec.-ft.*	1919.	*Feet.*	*Sec.-ft.*
Dec. 10	[a] 1.21	3.5	Mar. 28	1.61	22	May 31	1.95	50
			Apr. 1	1.81	37	June 10	1.64	22
1919.			13	1.72	30	21	1.42	12
Mar. 12	[a] 1.28	6.6	22	2.04	62	July 2	1.29	9.3
14	1.14	4.8	May 3	2.36	94	Oct. 3	1.10	2.9
21	1.22	5.9	12	2.16	71			

[a] Gage-discharge relation affected by ice.

[1] Published as "near Fort Bidwell" in Water-Supply Paper 380.

[2] List of ditches and diversions on pp. 336–339.

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Daily discharge, in second-feet, of Bidwell Creek at Fort Bidwell, Calif., for the year ending Sept. 30, 1919.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4.5	4.5	.....	34	109	45	8.5	3.2	0.5
2	4.5	4.5	.....	38	104	45	8.5	3.2	.5
3	4.5	4.5	.....	40	90	38	8.0	3.2	.5
4	4.5	4.5	.....	67	92	34	7.0	2.9	.5
5	4.5	4.5	.....	53	87	32	7.0	2.9	.5
6	4.5	4.5	.....	34	82	30	6.0	2.9	.5
7	4.5	4.5	.....	28	85	28	6.0	2.6	2.0
8	4.5	4.5	.....	22	87	28	6.0	2.6	2.0
9	4.1	4.5	.....	22	85	28	6.0	2.3	.5
10	4.1	4.5	.....	38	76	22	6.0	2.0	.5
11	3.4	4.5	5.0	38	76	21	6.0	2.0	.5
12	3.4	4.5	6.5	36	75	21	6.0	2.0	.5
13	3.4	4.5	6.0	28	74	21	6.0	2.0	.5
14	3.4	4.5	5.0	21	74	20	5.5	2.0	.5
15	7.0	7.0	6.0	24	76	18	5.5	2.0	.5
16	7.0	7.0	6.0	32	65	18	4.6	2.0	.5
17	4.5	7.0	6.0	40	63	16	3.5	2.0	.5
18	4.1	7.0	7.0	53	63	16	3.5	.5	.5
19	4.5	7.0	7.0	45	70	16	3.5	.5	.5
20	4.1	7.0	7.0	49	82	14	3.5	.5	.5
21	4.1	7.0	7.5	50	92	13	3.5	.5	.5
22	3.4	7.0	8.5	60	100	12	3.5	.5	.5
23	3.4	7.0	7.0	70	98	12	3.5	.5	.5
24	3.4	7.0	10	89	96	12	3.5	.5	.5
25	3.4	7.0	15	92	85	12	3.2	.5	.5
26	2.4	.....	16	76	85	12	3.2	.5	.5
27	4.5	.....	21	76	85	12	3.2	.5	.5
28	4.5	.....	24	89	85	11	3.2	.5	.5
29	4.5	.....	26	98	80	11	3.2	.5	.5
30	4.5	.....	33	109	67	11	3.2	.5	.5
31	4.5	.....	33	.....	53	.....	3.2	.5	.....

NOTE.—Discharge estimated because of ice as follows: Nov. 26–30, 5 second-feet; Dec. 1–31, 3.5 second-feet; Jan. 1–31 and Feb. 1–28, 3 second-feet; Mar. 1–10, 4 second-feet.

Monthly discharge of Bidwell Creek at Fort Bidwell, Calif., for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	7	2.4	4.25	261
November	7	.....	5.50	327
December	.....	.....	3.5	215
January	.....	.....	3.0	184
February	.....	.....	3.0	167
March	33	.....	9.76	600
April	109	21	51.7	3,080
May	109	53	82.0	5,040
June	45	11	21.0	1,250
July	8.5	3.2	4.94	304
August	3.2	.5	1.57	96.5
September	2.0	.5	.60	35.7
The year	109	.5	16.0	11,600

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COOKS LAKE NEAR FORT BIDWELL, CALIF.

LOCATION.—1½ miles south of headgate to Box Canyon Creek, 20 miles southeast of Fort Bidwell, Modoc County.

RECORDS AVAILBALE.—1918 and 1919; station discontinued.

GAGE.—Vertical staff driven into bed of lake against a large rock at west end of lake.

Gage height, in feet, of Cooks Lake, for the years ending Sept. 30, 1918 and 1919.

May 9, 1918	0.4	May 29, 1919	0.86
Mar. 31, 1919	−1.60	Sept. 25	−1.61
Apr. 30	1.45		

BOX CANYON CREEK NEAR FORT BIDWELL, CALIF.

LOCATION.—In S. ½ sec. 27, T. 46 N., R. 17 E., 1 mile above Fee's reservoir, 10 miles east of Fort Bidwell, Modoc County, below all tributaries above reservoir.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—Discharge measurements only for 1918 and 1919; station discontinued.

GAGE.—Vertical staff fastened to a juniper tree on right bank, 1 mile above reservoir.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed consists of boulders. Left bank is rim rock, right bank slopes gently for 200 feet and then is an abrupt rock bank. Control consists of boulders for low water and boulders and sage brush slope for high water.

DIVERSIONS.—None above.

REGULATION.—Flow completely regulated by operation of gates in Cooks Lake dam.

Discharge measurements of Box Canyon Creek near Fort Bidwell, Calif., during the year ending Sept. 30, 1919.

[Made by T. G. Bedford.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Dec. 10	.....	0	Mar. 31	2.60	51	Apr. 30	1.14	.3
Mar. 15	1.00	0	Apr. 14	1.41	2.2	May 28	1.33	1.4

WARNER LAKES BASIN.

COWHEAD LAKE NEAR FORT BIDWELL, CALIF.

LOCATION.—In S. ½ T. 47 N., R. 17 E., on road through Long Canyon to Schadler's ranch, 7 miles northeast of Fort Bidwell, Modoc County, and 1½ miles southeast of Schadler's house.

RECORDS AVAILABLE.—Occasional readings 1911 to 1913, 1918 and 1919; station discontinued.

DRAINAGE AREA.—43 square miles tributary to lake.

GAGE.—Painted on two large rocks near south end of lake.

COOPERATION.—Gage-height record furnished by H. W. Schadler.

Gage height, in feet, of Cowhead Lake, Calif., for the year ending Sept. 30, 1919.

Mar. 22	−0.53	June 9	0.79
Apr. 14	1.38	23	.48
May 8	1.37	Sept. 26	−1.41

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TWENTYMILE CREEK NEAR WARNER LAKE, OREG.

LOCATION.—In sec. 24, T. 40 S., R. 23 E., one-fourth mile above highway bridge on Warner Lake-Coleman Valley road at mouth of canyon, below all tributaries, 2 miles south of Warner Lake, Lake County.

DRAINAGE AREA.—155 square miles (measured on map issued by United States Reclamation Service) not including 58 square miles tributary to Cowhead Lake which contributed no water to Twentymile Creek from about June 1, 1911, except very little in spring of 1914.

RECORDS AVAILABLE.—March 1, 1910, to July 2, 1916, and December 16, 1917, to September 30, 1919, when station was discontinued.

GAGE.—Vertical staff attached to the gage well on right bank one-fourth mile above the bridge. A temporary gage was read from April 5 to September 30 and readings corrected to datum of regular gage. Read by Hannah Barry and M. R. Likens. Original gage, at the bridge March 1, 1910, was removed to the present site on June 3, 1910; gage readings during 1910 and 1911 at the present site were referred to the same datum. Readings for 1912–1914 are referred to a datum 0.32 foot lower than that used during 1911. A water-stage recorder was used March 31 to July 20, 1914, and December 3, 1914, to September 30, 1915. Staff gage was read weekly prior to December 3, 1914.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—A solid rock reef broken by crevices and obstructed by boulders and gravel, shifts slightly. Water seeps under the boulders and gravel.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.6 feet at 9 a. m. April 4 (discharge, 2,400 second-feet); minimum stage −0.10 foot August 1 (discharge, 1.4 second-feet).

1910–1916 and 1918–1919: Maximum stage recorded, 4.8 feet at original gage at bridge, March 1, 1910 (discharge 2,610 second-feet). The peak may have been higher. Minimum stage −0.10 foot, August 1, 1919 (discharge, 1.4 second-feet).

ICE.—Stage-discharge relation not affected by ice this year.

DIVERSIONS.—Some diversion for irrigation along Twelvemile and Fifteenmile creeks and along Eightmile Creek, a tributary of Cowhead Lake. Two small ditches divert just above the gage. A ditch also diverts from the head of Twelvemile Creek into Lake Anne for storage. See miscellaneous measurements, pages 339 and 340.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed April 4. Rating curves well defined. Gage read to hundredths twice daily December 17 to June 30, except as shown in footnote to daily-discharge table; read three times a week July 18 to September 30. Daily discharge ascertained by applying mean daily gage height to rating table. Records good for periods when gage was read.

Discharge measurements of Twentymile Creek near Warner Lake, Oreg., during the year ending Sept. 30, 1919.

[Made by T. G. Bedford.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1918.	*Feet.*	*Sec.-ft.*	1919.	*Feet.*	*Sec.-ft.*	1919.	*Feet.*	*Sec.-ft.*
Dec. 17	0.38	4.0	Apr. 25	2.16	85	June 20	0.72	13
1919.			26	1.82	54	21	.64	11
Mar. 17	.50	6.6	May 26	2.36	98	27	.52	8.1
Apr. 5	4.42	451	27	2.44	104	28	.34	6.4
7	2.38	103	June 6	1.52	39	Sept. 28	.14	3.0
			14	.73	14			

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Daily discharge, in second-feet, of Twentymile Creek near Warner Lake, Oreg., for the year ending Sept. 30, 1919.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	1.6	a 6	11	900	.....	48	.....	1.4	2.8
2	.....	1.6	a 6	13	488	.....	49	.....	1.6	a 2.8
3	.....	1.6	6	9.5	520	.....	a 40	.....	a 2.0	a 2.8
4	.....	1.6	6	9	1,850	.....	31	.....	2.4	2.8
5	.....	2.0	6	8.5	602	.....	29	.....	a 2.3	a 2.8
6	.....	2.3	6	a 8	188	.....	28	.....	a 2.1	2.8
7	.....	2.3	7	7.5	135	.....	37	.....	2.0	a 3.9
8	.....	2.5	6	a 7.5	100	.....	a 32	.....	a 2.4	5.0
9	.....	2.7	191	7.5	91	.....	a 28	.....	2.8	a 5.0
10	.....	3.2	20	6	218	.....	23	.....	a 2.7	5.0
11	.....	3.7	18	6.5	216	.....	17	.....	a 2.5	a 5.0
12	.....	3.7	16	7.5	159	.....	a 16	.....	2.4	a 5.0
13	.....	3.9	17	7.5	95	.....	14	.....	a 2.4	5.0
14	.....	4.2	13	a 8	40	.....	13	.....	2.4	a 4.4
15	.....	5.5	11	a 8	56	.....	14	.....	a 2.4	3.9
16	.....	7	a 12	8.5	176	.....	13	.....	2.4	a 3.7
17	4.6	12	13	7.5	a 162	.....	13	.....	a 2.2	a 3.5
18	3.7	15	13	9.5	a 148	.....	14	1.6	2.0	3.3
19	3.5	15	9.5	9.5	a 134	.....	14	1.9	a 2.0	a 3.0
20	3.2	10	10	9	a 121	.....	13	a 2.2	2.0	2.8
21	3.2	10	9	13	a 107	.....	11	a 2.5	a 2.0	a 2.6
22	3.2	a 12	9.5	22	a 93	.....	a 10	2.8	a 2.0	2.4
23	3.2	a 13	9	27	79	.....	a 10	a 2.4	2.0	a 2.3
24	2.3	15	9	a 40	a 68	.....	a 9	2.0	a 2.2	a 2.3
25	2.8	14	12	52	56	.....	a 9	a 1.8	2.4	2.2
26	2.1	6	a 12	102	55	109	a 9	1.6	a 2.4	a 2.1
27	1.9	6	a 12	215	.....	109	9	a 1.7	2.4	2.0
28	1.9	6	a 11	308	.....	98	7.5	a 1.9	a 2.4	a 2.0
29	1.4	6	.....	495	.....	97	7.5	2.0	a 2.4	2.0
30	1.4	6	.....	645	.....	a 81	7.5	a 2.0	2.4	2.0
31	1.4	a 6	.....	760	.....	a 64	.....	2.0	a 2.6	.....

a Interpolated.

NOTE.—No record Oct. 1 to Dec. 16, Apr. 27 to May 25, and July 1–17. October, November, and May estimated in monthly table. Dec. 1–16 estimated as 5 second-feet, Apr. 27–30 as 50 second-feet, and July 1–17 as 5 second-feet.

Monthly discharge of Twentymile Creek near Warner Lake, Oreg., for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	.....	.....	a 4.0	246
November	.....	.....	a 5.0	298
December	.....	1.4	3.85	237
January	15	1.6	6.50	400
February	191	6	17.0	944
March	760	6	91.9	5,650
April	1,850	.....	236	14,000
May	.....	.....	a 81.0	4,980
June	49	7.5	19.5	1,160
July	.....	.....	1.2	74
August	2.8	1.4	2.25	138
September	5	2.0	3.24	193
The year	1,850	.....	39.2	28,300

a Estimated.

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KEENO CREEK NEAR FORT BIDWELL, CALIF.

LOCATION.—In sec. 1, T. 47 N., R. 17 E., on Nevada-California State line, at proposed point of diversion 1 mile above Cowhead Lake outlet, 9 miles southwest of Warner Lake, Oreg., and 12 miles northeast of Fort Bidwell, Modoc County, Calif.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 11, 1917, to September 30, 1919, when station was discontinued.

GAGE.—Vertical staff in two sections cut in the solid rock ledge on the left bank just above a sheep corral at the point of diversion.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Solid rock and boulders, permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 2.65 feet, from flood marks on gage, night of April 2 (discharge, about 100 second-feet); no flow October 1 to March 23 and April 24 to September 30.

ICE.—Creek is usually dry during winter.

DIVERSION.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 40 second-feet and extended above. Gage read to hundredths occasionally by the hydrographer, and hydrographs plotted from gage readings and maximum stage between readings determined from flood marks on gage. Daily discharge ascertained by applying mean daily gage height to rating table. Monthly mean discharge determined by comparison with other streams in Twentymile Creek basin. Records fair.

Discharge measurements of Keeno Creek near Fort Bidwell, Calif., during the year ending Sept. 30, 1919.

[Made by T. G. Bedford.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1918.	*Feet.*	*Sec.-ft.*	1919.	*Feet.*	*Sec.-ft.*	1919.	*Feet.*	*Sec.-ft.*
Dec. 15	1.16	0	Apr. 2	2.18	36.3	May 8		0
1919.			3	1.84	12.3	June 23		0
Mar. 19		0	9	1.50	2.5	Sept. 28		0
27	2.23	[a] 2	10	1.70	7.3			
			24	1.14	0			

[a] Estimated.

Daily discharge, in second-feet, of Keeno Creek near Fort Bidwell, Calif., for the year ending Sept. 30, 1919.

Day.	Mar.	Apr.	Day.	Mar.	Apr.	Day.	Mar.	Apr.
1			11			21		
2		46	12			22		
3		59	13			23		
4			14			24		
5			15			25		
6			16			26		
7			17			27	0.2	
8			18			28		
9		4.5	19			29		
10		7.5	20			30		
						31		

NOTE.—Stream dry Oct. 1 to Mar. 23 and Apr. 24 to Sept. 30. No daily record except where given.

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Monthly discharge of Keeno Creek near Fort Bidwell, Calif., for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.	Run-off in acre-feet.
	Mean.	
March	[a] 1.0	61
April	[a] 9.5	565
The year		626

[a] Estimated.

FIFTEENMILE CREEK NEAR WARNER LAKE, OREG.[1]

LOCATION.—In sec. 21, T. 41 S., R. 23 E., at highway bridge on Fort Bidwell-Warner Lake road, 1½ miles north of California-Oregon State line, 15 miles northeast of Fort Bidwell, Calif., and 8 miles southwest of Warner Lake, Lake County, Oregon.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 19 to May 15, 1913, and December 8, 1917, to September 30, 1919, when station was discontinued.

GAGE.—Vertical staff in two sections, first section on left upstream corner of the bridge, second section 30 feet upstream from bridge. Read by stage driver.

DISCHARGE MEASUREMENTS.—Made by wading or from the bridge.

CHANNEL AND CONTROL.—Control consists of several large boulders at lower side of bridge for extreme low water, boulders and gravel 30 feet downstream from bridge for medium water and the bridge and graded road for high water. Practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.9 feet night of April 4 (discharge, 78 second-feet); minimum stage 0.32 foot August 18–30 and September 28 (discharge, 0.9 second-foot).

DIVERSIONS.—Several very small irrigation ditches, negligible.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to hundredths once daily except Sunday. Daily discharge ascertained by applying daily gage height to rating table and interpolating discharge for Sunday. Records good.

Discharge measurements of Fifteenmile Creek near Warner Lake, Oreg., during the year ending Sept. 30, 1919.

[Made by T. G. Bedford.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Dec. 17	[a] 0.64	1.2	Apr. 4	2.65	74	May 21	0.76	5.4
Mar. 18	.34	1.0	8	.77	5.1	June 7	.57	2.2
Mar. 20	.32	.9	23	.93	9.0	June 24	.46	1.6
24	.51	2.1	25	1.12	15	Sept. 28	.32	.9

[a] Stage-discharge relation affected by ice.

[1] Published as Fifteenmile Creek near Fort Bidwell, Calif., in Water-Supply Paper 369.

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Daily discharge, in second-feet, of Fifteenmile Creek near Warner Lake, Oreg., for the year ending Sept. 30, 1919.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.9	1.0	1.5	.....	48	10	3.8	1.4	0.8	1
2	1.0	1.0	1.0	.....	13	10	3.6	1.4	.8	1
3	1.0	1.1	1.0	.....	64	9.5	3.3	1.4	.9	1
4	1.0	1.2	1.0	.....	74	8	3.0	1.4	1	1
5	1.0	1.2	1.0	.....	11	9	3.0	1.4	1	1
6	1.0	1.2	1.0	.....	8	8	2.8	1.4	1	1
7	1.0	1.2	1.0	.....	5	8	2.8	1.4	1	1
8	1.0	1.3	.....	.....	5	8	2.7	1.4	1	1
9	1.0	1.3	.....	.....	6	7.5	2.6	1.3	1	1
10	1.0	1.3	.....	.....	8	7	2.6	1.2	1	1
11	1.0	1.2	.....	.....	7.5	7	3.0	1.2	1	1
12	1.0	1.1	.....	.....	8	7	2.8	1.2	1	1
13	1.0	1.1	.....	.....	5.5	6.5	2.7	1.2	1	1
14	1.0	1.1	.....	.....	3.0	6.5	2.6	1.2	1	1
15	1.0	1.2	.....	.....	3.0	6.5	2.6	1.2	1	1
16	1.0	1.2	.....	.....	6.5	6.5	2.5	1.1	1	1
17	1.0	1.2	1.0	1.0	6.5	6	2.4	1.1	1	1
18	1.0	1.2	.....	1.0	11	5.5	2.2	1.1	.9	1
19	1.0	1.2	.....	1.0	8	5	2.0	1.1	.9	1
20	1.0	1.2	.....	1.0	8.5	5	2.0	1.1	.9	1
21	1.0	1.2	.....	1.3	9	5.5	1.9	1	.9	1
22	1.0	1.2	.....	1.6	8	5	1.8	1	.9	1
23	1.0	1.2	.....	1.9	10	5	1.7	1	.9	1
24	1.0	1.8	.....	2.2	17	4.8	1.7	1	.9	1
25	1.0	2.5	.....	2.5	16	4.7	1.6	1	.9	1
26	1.0	2.5	.....	2.5	9	4.6	1.4	1	.9	1
27	1.0	2.5	.....	3.0	10	4.5	1.4	1	.9	1.1
28	1.0	2.5	.....	4.0	11	4.3	1.4	1	.9	.9
29	1.0	2.5	.....	5.0	10	4.0	1.4	1	.9	1
30	1.0	2.0	.....	22	10	4.0	1.4	1	.9	1
31	1.0	.....	.....	38	.....	4.0	.....	1	.9	.....

NOTE.—Discharge estimated because of ice as follows: Dec. 8–16, 1.0 second-foot; Dec. 18–28, 0.6 second-foot; Dec. 29–31, 0.1 second-foot; Jan. 1–31, 0.1 second-foot: Feb. 1–23, 0.5 second-foot; Mar. 1–16, as 1.0 second-foot. Gage not read on Sunday, discharge interpolated.

Monthly discharge of Fifteenmile Creek near Warner Lake, Oreg., for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1.0	0.9	1.00	61.5
November	2.5	1.0	1.45	86.3
December	1.5	.....	.79	48.6
January	.....	.....	.1	6.1
February	.....	.....	.5	27.8
March	38	.....	3.35	206
April	74	3	14.0	833
May	10	4	6.35	390
June	3.8	1.4	2.36	140
July	1.4	1.0	1.17	71.9
August	1.0	.8	.94	57.7
September	1.1	.9	1.0	59.5
The year	74	.8	2.75	1,990

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TWELVEMILE CREEK NEAR FORT BIDWELL, CALIF.

LOCATION.—In NE. ¼ NE. ¼ sec. 31, T. 48 N., R. 17 E., a quarter of a mile below mouth of Tenmile Creek, at bridge on Fort Bidwell-Warner Lake road a quarter of a mile south of Oregon-California State line, 10 miles southwest of Warner Lake, Oreg., and 12 miles northeast of Fort Bidwell, Modoc County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 14 to June 30, 1912; April 1 to June 17, 1913, and December 8, 1917, to September 30, 1919, when station was discontinued.

GAGE.—Vertical staff gage nailed to one of a clump of large cottonwood trees on left bank, 80 feet below the bridge; read by M. R. Likens.

DISCHARGE MEASUREMENTS.—Made by wading or from the bridge.

CHANNEL AND CONTROL.—Boulders and gravel 15 feet below gage, permanent. Banks are gravel and are abrupt.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.8 feet May 28 and 29 (discharge, 102 second-feet); minimum stage 1.43 feet August 18–28 (discharge, 1.0 second-foot).

DIVERSIONS.—Peterson ditch, capacity about 20 second-feet, diverts from South Fork of Twelvemile Creek 3 miles above the gage. Eightmile Creek, a tributary of Twelvemile Creek, is diverted partly at Shadler's ranch and partly into Lake Anne for storage. La Xague and Fisher ditches divert below the gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed May 22. Rating curves well defined. Gage read to hundredths once a day except Sunday. Daily discharge ascertained by applying mean daily gage height to rating table except December 15 to March 20 when ice affected flow. Discharge for this period estimated.

Discharge measurements of Twelvemile Creek near Fort Bidwell, Calif., during the year ending Sept. 30, 1919.

[Made by T. G. Bedford.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Dec. 17	1.54	1.3	Apr. 11	1.90	10	June 2	2.35	38
Mar. 18	1.48	1.5	May 4	2.55	54	7	2.18	28
24	1.56	3.2	21	2.78	86	13	1.94	15
Apr. 4	2.09	19	26	2.77	97	24	1.74	6.4
						Sept. 27	1.43	.8

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Daily discharge, in second-feet, of Twelvemile Creek near Fort Bidwell, Calif., for the year ending Sept. 30, 1919.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.5	2.3	2.5				13	48	45	6.0	1.8	1.2
2	1.5	2.3	2.5				8.5	54	40	6.0	1.6	1.2
3	1.6	2.4	2.6				12	54	57	5.5	1.6	1.2
4	1.8	2.5	2.8				19	54	36	5.5	1.6	1.2
5	1.8	2.5	2.8				16	54	34	5.0	1.6	1.2
6	1.8	2.5	2.8				14	54	32	5.0	1.4	1.2
7	1.7	2.5	2.8				13	54	27	4.9	1.4	1.4
8	1.6	2.5	2.8				12	67	24	4.7	1.4	1.6
9	1.6	2.5	2.8			1.4	12	58	22	4.0	1.6	1.6
10	1.6	2.6	3.0				13	54	22	3.6	1.6	1.6
11	1.6	2.6	2.9				11	57	16	3.6	1.6	1.6
12	1.6	2.6	2.8				10	60	14	3.6	1.6	1.4
13	1.6	2.5	3.2				9.0	54	14	3.4	1.4	1.3
14	1.5	2.5	3.2				8.0	60	14	3.2	1.4	1.2
15	1.5	2.8	2.2		1.2		11	58	13	3.2	1.3	1.2
16	1.5	2.8	1.3	1.2			8.0	67	12	3.1	1.3	1.2
17	1.9	2.8	1.3			1.5	9.0	54	12	2.9	1.2	1.2
18	1.8	2.8	1.3			1.5	15	57	11	2.7	1.0	1.2
19	1.9	2.8	1.3			1.5	11	60	11	2.5	1.0	1.2
20	2.0	2.8	1.3			1.6	12	67	11	2.2	1.0	1.2
21	2.0	2.8	1.3			2.0	12	88	12	2.0	1.0	1.2
22	2.0	2.8	1.3			2.4	12	91	10	1.8	1.0	1.2
23	2.0	2.8	1.3			2.8	15	94	8.5	1.8	1.0	1.2
24	2.0	2.6	1.3			3.3	15	98	7.0	1.8	1.0	1.2
25	2.0	2.5	1.3			3.5	28	97	8.5	1.8	1.0	1.2
26	2.0	2.5	1.3			3.8	17	96	7.0	1.8	1.0	1.2
27	2.0	2.5	1.3			5.0	27	94	7.5	1.8	1.0	1.2
28	2.0	2.5	1.3			6.5	37	102	7.5	1.8	1.0	1.2
29	2.2	2.5	1.3		.....	8.0	31	102	7.0	1.8	1.1	1.2
30	2.2	2.5	1.3		.....	10	44	70	6.5	1.8	1.1	1.2
31	2.3	.....	1.3		.....	13	.....	50	.....	1.8	1.1	.....

NOTE.—Discharge, Dec. 15 to Mar. 20, estimated because of ice. Gage not read on Sundays; discharge interpolated. Braced figures show mean discharge for periods indicated.

Monthly discharge of Twelvemile Creek near Fort Bidwell, Calif., for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	2.3	1.5	1.81	111
November	2.8	2.3	2.59	154
December	3.2	1.3	2.02	124
January	.....	.....	1.2	73.8
February	.....	.....	1.2	66.6
March	13	.....	2.86	176
April	44	8	15.8	940
May	102	48	68.6	4,220
June	57	6.5	18.3	1,090
July	6.0	1.8	3.25	200
August	1.8	1.0	1.28	78.7
September	1.6	1.2	1.27	75.6
The year	102	1.0	10.1	7,310

EAST FORK OF HORSE CREEK NEAR FORT BIDWELL, CALIF.

LOCATION.—In T. 46 N., R. 18 E., Washoe County, Nev., three-fourths mile above junction with West Fork of Horse Creek, 5 miles above junction with Twelvemile Creek, 10 miles south of Warner Lake, Oreg. and 14 miles northeast of Fort Bidwell, Modoc County.

DRAINAGE AREA.—Not measured.

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Records available.—December 21, 1917, to September 30, 1919, when station was discontinued.

Gage.—Vertical staff nailed to a fence post on left bank.

Discharge measurements.—Made by wading.

Channel and control.—Large boulders in loose shifting sand. Not permanent.

Extremes of discharge.—Maximum stage during year, 2.5 feet, date not known, from flood marks on gage (discharge, about 38 second-feet); minimum discharge estimated to be about 0.2 second-foot.

Ice.—Heavy ice and snow during winter.

Diversions.—None.

Regulation.—None.

Accuracy.—Stage-discharge relation practically permanent. Rating curve well defined below 15 second-feet and extended above. Gage read to hundredths occasionally by the hydrographer, and hydrographs plotted from gage readings and maximum stage between readings determined from flood marks on gage. Daily discharge ascertained by applying mean daily gage height to rating table. Monthly discharge determined by comparison with other streams in Twentymile Creek basin. Records fair.

Discharge measurements of East Fork of Horse Creek near Fort Bidwell, Calif., during the year ending Sept. 30, 1919.

[Made by T. G. Bedford.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Dec. 16		[a] 0.2	Apr. 10	1.82	5.8	June 7	1.39	.4
Mar. 19	1.47	.8	24	1.50	1.0	23	1.37	.4
Apr. 3	1.98	11	May 7	1.40	.4	Sept. 28	1.30	.2
9	1.63	2.6	22	1.40	.5			

[a] Estimated.

Daily discharge, in second-feet, of East Fork of Horse Creek near Fort Bidwell, Calif., for year ending Sept. 30, 1919.

Dec. 16, 1918	0.2	Apr. 10, 1919	5.5	June 7, 1919	0.4
		23	1.4	23	.4
Mar. 19, 1919	.8	24	1.2	Sept. 28	.2
Apr. 3	21	May 7	.4		
9	3.5	22	.5		

Note.—No record except on days for which discharge is given.

Monthly discharge of East Fork of Horse Creek near Fort Bidwell, Calif., for the year ending Sept. 30, 1919.

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October	0.4	24.6	May	0.5	30.7
November	.3	17.9	June	.4	23.8
December	.2	12.3	July	.3	18.4
January	.2	12.3	August	.2	12.3
February	.4	22.2	September	.2	11.9
March	2.5	154			
April	7.0	417	The year		757

E.—Monthly discharge estimated from current-meter measurements and by comparison with records of other streams in Twentymile Creek basin.

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WEST FORK OF HORSE CREEK NEAR FORT BIDWELL, CALIF.

LOCATION.—In T. 46 N., R. 18 E., Washoe County, Nev., 1200 feet above junction with East Fork of Horse Creek, 5 miles above junction with Twelvemile Creek, 10 miles south of Warner Lake, Oreg. and 14 miles northeast of Fort Bidwell, Modoc County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 21, 1917, to September 30, 1919, when station was discontinued.

GAGE.—Vertical staff nailed to a juniper tree on right bank.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Large boulders and gravel; probably permanent. Banks covered with grass and sage brush.

EXTREMES OF DISCHARGE.—Maximum stage during year, 1.3 feet, date not known, from flood marks on gage (discharge, 146 second-feet); no flow October 1 to March 31 and April 30 to September 30.

ICE.—No flow in winter.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to hundredths occasionally by the hydrographer, and hydrographs plotted from gage readings and the maximum stage between readings determined from flood marks on gage. Daily discharge ascertained by applying mean daily gage height to rating table. Monthly mean discharge determined by comparison with other streams in Twentymile Creek basin. Records fair.

Discharge measurements of West Fork of Horse Creek near Fort Bidwell, Calif., during the year ending Sept. 30, 1919.

[Made by T. G. Bedford.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Dec. 10		0	Apr. 3	0.95	83	May 7		0
Mar. 19		0	9	.02	1.4	June 23		0
Apr. 3	0.54	28	10	.38	13	Sept. 28		0
			24	−.04	.7			

Daily discharge, in second-feet, of West Fork of Horse Creek near Fort Bidwell, Calif., for the year ending Sept. 30, 1919.

Dec. 16, 1918	0	Apr. 10, 1919	13	May 7, 1919	0
Mar. 19, 1919	0	23	.9	June 23	0
Apr. 3	59	24	.7	Sept. 28	0
9	2.5	30	0		

NOTE.—No flow in creek Oct. 1 to Mar. 31 and Apr. 30 to Sept. 30. Mean discharge for April estimated 9.8 second-feet or a run-off of 583 acre-feet which is also the total run-off for the year.

ROCK CREEK NEAR FORT BIDWELL, CALIF.

LOCATION.—On line between secs. 21 and 28, T. 47 N., R. 18 E., Washoe County, Nev., at proposed point of diversion into Cowhead Lake, 1½ miles above mouth, 9 miles south of Warner Lake, Oreg., and 13 miles northeast of Fort Bidwell, Modoc County.

DRAINAGE AREA.—33 square miles.

RECORDS AVAILABLE.—March 7 to May 15, 1913, and December 10, 1917, to September 30, 1919, when station was discontinued.

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GAGE.—Inclined staff nailed over the original gage which is bolted to solid rock ledge on left bank 1½ miles above mouth of creek. Original gage was used in 1913. Datum of new gage is about 0.51 foot higher than original gage.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Boulders over entire width of channel, permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year, 4.0 feet, date not known, from flood marks on gage (discharge, about 700 second-feet); no flow December 15 to March 23, and June 13 to September 30.

ICE.—Seriously affected by ice during winter.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to hundredths occasionally by the hydrographer, and the maximum stage between visits obtained from flood marks on gage. Mean daily gage height determined from hydrograph of the gage readings obtained. Mean daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

Discharge measurements of Rock Creek near Fort Bidwell, Calif., during the year ending Sept. 30, 1919.

[Made by T. G. Bedford.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Dec. 12	0.89	[a] 0.2	Apr. 9	2.02	39	May 22	1.13	1.3
Mar. 19		0	10	2.42	101	June 7	.79	.1
27	[b] 2.19	6.6	24	1.94	28	23		0
Apr. 2	3.15	309	May 8	1.19	1.4	Sept. 28		0
3	2.57	130						

[a] Estimated. [b] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Rock Creek near Fort Bidwell, Calif., for the year ending Sept. 30, 1919.

Dec. 12, 1918	0.2	Apr. 10, 1919	137	May 8, 1919	1.4
Mar. 19, 1919	0	23	34	22	1.3
27	11	24	40	June 7	.1
Apr. 2	275	May 4	2.8	23	0
3	287	7	1.4	Sept. 28	0
9	40				

NOTE.—Creek dry Dec. 15 to Mar. 23 and June 13 to Sept. 30.

Monthly discharge of Rock Creek near Fort Bidwell, Calif., for the year ending Sept. 30, 1919.

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October	0.2	12.3	May	1.6	98.4
November	.2	11.9	June	.04	2.4
December	.1	6.1	July	0	0
January	0	0	August	0	0
February	0	0	September	0	0
March	16.5	1,010			
April	105	6,250	The year		7,300

NOTE.—Monthly discharge estimated from comparison with records of flow of other streams in Twenty-mile Creek basin.

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DEEP CREEK ABOVE DISMAL CREEK, NEAR WARNER LAKE, OREG.

LOCATION.—In NE. ¼ SW. ¼ sec. 29, T. 40 S., R. 22 E., at south end of Big Valley, 500 feet above Dismal Creek, 15 miles north of Fort Bidwell, Calif., and 10 miles west of Warner Lake, Lake County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 5, 1917, to September 30, 1919, when station was discontinued.

GAGE.—Vertical staff gage on left bank, 300 feet above mouth of Dismal Creek at south end of Big Valley. Original gage used from December 5 to April 17 was a vertical staff gage on right bank 500 feet above Dismal Creek. No relation between gages. Read by Miss E. C. Johnson.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Control for old gage consisted of gravel and brush and not permanent. Control for new gage consists of large boulders and gravel and is permanent. Banks are loose dirt 2 feet high.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.3 feet night of May 22 (discharge, 186 second-feet); minimum stage, 2.55 feet August 27–29 (discharge, 1.9 second-feet).

WINTER FLOW.—Stage-discharge relation probably seriously affected by ice December to March.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 200 second-feet. Gage read to hundredths once daily from May 5 to September 30. No observer available October 1 to May 4. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

Discharge measurements of Deep Creek above Dismal Creek, near Warner Lake, Oreg., during the period Oct. 1, 1918, to Oct. 1, 1919.

[Made by T. G. Bedford.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1918.	*Feet.*	*Sec.-ft.*	1919.	*Feet.*	*Sec.-ft.*	1919.	*Feet.*	*Sec.-ft.*
Dec. 13	2.67	2.5	May 23	3.99	139	June 17	3.04	25
1919.			June 4	3.37	55	30	2.90	16
Mar. 25	2.70	4.4	5	3.34	53	30	2.84	13
May 5	3.78	105	16	3.04	26	Oct. 1	2.60	3.1
6	3.60	86						

Daily discharge, in second-feet, of Deep Creek above Dismal Creek, near Warner Lake, Oreg., for the year ending Sept. 30, 1919.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	.....	[a]85	14	3.6	[b]2.0	16	83	23	5.5	2.2	2.6
2	.....	65	12	3.6	[b]2.1	17	[b]108	26	5.5	2.2	2.6
3	.....	[b]60	13	3.6	[b]2.2	18	132	25	5.0	2.2	2.6
4	.....	55	12	3.1	[b]2.3	19	[b]132	21	5.0	2.2	2.6
5	108	57	11	2.9	[b]2.4	20	139	16	5.0	2.2	2.6
6	104	57	10	2.9	[b]2.5	21	154	17	5.0	2.2	2.5
7	118	[a]90	9.0	2.6	[b]2.6	22	183	15	4.4	2.0	2.5
8	[b]114	[b]98	9.0	2.6	2.6	23	151	12	4.4	2.0	2.5
9	[b]110	[b]106	9.5	2.5	2.6	24	[b]147	12	4.7	2.0	2.5
10	[b]106	[b]115	8.5	2.3	2.6	25	[b]143	15	4.4	2.0	2.5
11	[b]102	[b]123	7.5	2.2	2.5	26	139	15	4.4	2.0	2.5
12	[b]99	[b]131	7.5	2.2	2.5	27	[b]132	14	4.2	1.9	2.5
13	[b]95	139	5.0	2.2	2.5	28	[b]125	15	4.2	1.9	2.6
14	[b]91	[b]84	5.0	2.2	2.6	29	118	14	4.2	1.9	2.6
15	[b]87	29	5.5	2.2	2.6	30	[a]108	13	3.9	2.0	[b]2.6
						31	[a]96	.....	3.9	[b]2.0	.....

[a] Estimated. [b] Interpolated.

NOTE.—No record Oct. 1 to May 4.

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Monthly discharge of Deep Creek above Dismal Creek, near Warner Lake, Oreg., for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 5–31	183	83	119	6,370
June		12	51.6	3,070
July	14	3.9	3.27	201
August	3.6	1.9	2.37	146
September	2.6	2.0	2.50	149
The period				9,940

DEEP CREEK BELOW DISMAL CREEK, NEAR WARNER LAKE, OREG.[1]

LOCATION.—In NE. ¼ SW. ¼ sec. 29, T. 40 S., R. 22 E., at south end of Big Valley, 200 feet below mouth of Dismal Creek, 15 miles north of Fort Bidwell, Calif., and 10 miles west of Warner Lake, Lake County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 1 to June 17, 1913, and December 5, 1917, to September 30, 1919, when station was discontinued.

GAGE.—Vertical staff gage on left bank 200 feet below mouth of Dismal Creek at south end of Big Valley; read by Miss E. C. Johnson.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Boulders and coarse gravel, permanent. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.5 feet night of May 22 (discharge, 560 second-feet); minimum stage 0.26 foot August 29 and September 23–26 (discharge, 3.8 second-feet).

DIVERSIONS.—Cressler's ditch, capacity 30 second-feet, diverts water half a mile below gage; Billup's and Conlan's ditches, capacity about 2.5 second-feet, divert from Dismal Creek about half a mile above its mouth.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed May 22. Rating curves well defined. Gage read to hundredths once daily from May 5 to September 30. No observer available from October 1 to May 4. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

Discharge measurements of Deep Creek below Dismal Creek, near Warner Lake, Oreg., during the period Oct. 1, 1918, to Oct. 1, 1919.

[Made by T. G. Bedford.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1918.	*Feet.*	*Sec.-ft.*	1919.	*Feet.*	*Sec.-ft.*	1919.	*Feet.*	*Sec.-ft.*
Dec. 13	0.39	4.0	May 6	2.08	156	June 16	1.08	43
			22	3.20	455	17	1.09	48
1919.			23	2.58	278	30	.86	24
Mar. 25	.48	5.7	June 4	1.55	86	30	.78	21
May 5	2.28	191	5	1.53	96	Oct. 1	.26	3.8

[1] Published as "Deep Creek above Big Valley, near Fort Bidwell, Calif." in Water-Supply Paper 340.

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Daily discharge, in second-feet, of Deep Creek below Dismal Creek, near Warner Lake, Oreg., for the year ending Sept. 30, 1919.

Day.	Dec.	Mar.	May.	June.	July.	Aug.	Sept.
1				a 170	23	6.5	b 3.9
2				107	21	6.5	b 3.9
3				b 98	22	6	b 4.0
4				88	21	5	b 4.1
5			198	91	19	5	b 4.2
6			212	85	16	4.8	b 4.3
7			246	a 125	16	4.6	b 4.4
8			b 237	b 133	15	4.4	4.4
9			b 228	b 141	15	4.4	4.4
10			b 219	b 149	14	4.4	4.4
11			b 210	b 157	12	4.4	4.2
12			b 202	b 165	13	4.4	4.2
13	4		b 198	173	11	4.4	4.2
14			b 184	b 112	11	4.4	4.4
15			b 175	52	11	4.4	4.4
16			166	42	11	4.4	4.4
17			b 240	45	10	4.4	4.4
18			314	46	9.5	4.2	4.4
19			b 314	35	9.5	4.2	4.4
20			388	35	9.5	4.1	4.4
21			419	35	9	4.1	3.8
22			436	35	9	4.1	3.9
23			387	28	8.5	3.9	3.8
24			b 369	28	8	3.9	3.8
25		5.7	b 352	28	8	3.9	3.8
26			334	28	7	3.9	3.8
27			b 305	27	7	3.9	3.9
28			b 275	27	7	3.9	4.4
29			246	24	7	3.8	4.4
30			a 236	24	6.5	3.9	b 4.4
31			a 195		6.5	b 3.9	

a Estimated. b Interpolated.

NOTE.—No record Oct. 1 to May 4.

Monthly discharge of Deep Creek below Dismal Creek, near Warner Lake, Oreg., for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 5-31	436	166	270	14,500
June	173	24	77.8	4,630
July	23	6.5	12.0	738
August	6.5	3.8	4.45	274
September	4.4	3.8	4.18	249
The period				20,400

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DEEP CREEK AT ADEL, OREG.

LOCATION.—In SE. ¼ sec. 21, T. 39 S., R. 24 E., just back of Wible's Hotel at Adel, Lake County, one-eighth mile upstream from wagon bridge, below all tributaries.

DRAINAGE AREA.—250 square miles (measured on U. S. Reclamation Service map).

RECORDS AVAILABLE.—May 11, 1909, to May 31, 1916, and December 18, 1917, to September 30, 1919, when station was discontinued.

GAGE.—Vertical staff gage in two sections on left bank one-eighth mile above the bridge. One section is at the water's edge and the other is painted on the northwest corner of the gage well previously used. A Barrett & Lawrence water-stage recorder was used from June 20 to September 30, 1914, March 19 to May 27, 1915, and March 7 to May 31, 1916. A Friez water-stage recorder was used March 10 to June 19, 1914. At all other times the staff gage was read by W. S. Wible.

DISCHARGE MEASUREMENTS.—Made from the wagon bridge or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; probably permanent except for slight shifts affecting only low water; banks are overflowed at gage and bridge in extreme floods. Zero flow, gage height about 2.0 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.4 feet at 2 p. m. April 4 (discharge, 1,780 second-feet); minimum stage 2.4 feet July 18–21 (discharge, 1.4 second-feet).

1909–1919: Maximum stage recorded, 9.0 feet at 6 p. m. March 2, 1910 (discharge, 4,950 second-feet); minimum stage 2.4 feet July 18–21, 1919 (discharge, 1.4 second-feet).

ICE.—Stage-discharge relation affected by ice December 1 to February 28.

DIVERSIONS.—Considerable area irrigated from tributaries, and 2,000 or 3,000 acres watered by natural flooding in Big Valley and Crane Lake. Five ditches, with a total capacity of about 30 second-feet, divert water within 2 miles above the gage and carry about 5,000 acre-feet around the gage each year. See "Miscellaneous measurements," page 340.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed April 4; moss on control July 16 to September 30; affected by ice December 1 to February 28. Rating curve used October 1 to April 4 well defined above 16 second-feet; curve used April 5 to July 15 well defined above 8 second-feet; shifting-control method used July 16 to September 30. Gage read twice a day to tenths. Daily discharge ascertained by applying mean daily gage height to rating table, except for period of ice effect. Records good except for July, August, and September, which are fair.

Discharge measurements of Deep Creek at Adel, Oreg., during the year ending Sept. 30, 1919.

[Made by T. G. Bedford.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Dec. 17	[a] 2.62	5.2	Apr. 6	3.91	232	June 13	3.18	38
Mar. 17	2.76	18	6	4.46	443	27	2.67	8.8
18	2.77	19	May 9	4.48	459	28	2.66	7.3
Apr. 5	5.38	928	June 2	3.68	151			

[a] Stage-discharge relation affected by ice.

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Daily discharge, in second-feet, of Deep Creek at Adel, Oreg., for the year ending Sept. 30, 1919.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	43	15	15	825	625	191	9.5	2.9	2.6
2	36	15	15	600	625	177	9.5	2.9	2.6
3	36	15	15	765	600	126	9.5	2.9	2.6
4	36	15	15	1,600	550	105	9.5	2.9	2.6
5	36	15	15	890	575	105	9.5	2.9	2.6
6	30	15	15	359	550	105	9.5	2.9	2.6
7	24	15	15	363	482	77	9.5	2.9	2.6
8	24	15	15	278	482	77	6.0	2.9	2.6
9	24	15	15	260	438	77	6.0	2.9	2.6
10	24	15	15	335	415	77	6.0	2.9	2.6
11	24	24	17	625	395	77	3.3	2.9	2.6
12	24	24	20	395	395	61	3.3	2.9	2.6
13	24	36	20	375	335	54	3.3	2.9	2.6
14	24	36	20	297	335	47	3.3	2.9	2.6
15	24	24	20	297	335	47	3.3	2.9	2.6
16	51	24	20	482	335	41	3.1	2.8	2.4
17	51	24	20	625	297	35	2.2	2.8	2.4
18	51	24	20	825	260	35	1.4	2.8	2.4
19	36	24	20	650	260	24	1.4	2.8	2.4
20	36	15	20	600	355	20	1.4	2.8	2.4
21	36	15	20	650	355	15	1.4	2.8	2.4
22	36	15	20	705	355	15	3.1	2.8	2.4
23	36	15	31	765	395	15	3.1	2.8	2.4
24	36	15	43	825	375	12	3.1	2.8	2.4
25	24	15	68	922	355	9.5	3.1	2.8	2.4
26	24	15	154	705	335	9.5	3.1	2.8	2.4
27	15	15	318	735	335	9.5	3.1	2.8	2.4
28	15	15	318	765	316	9.5	3.1	2.8	2.4
29	15	15	705	705	260	9.5	3.1	2.8	6.0
30	15	15	890	600	242	9.5	3.1	2.8	6.0
31	15	.....	825	.....	207	.....	3.1	2.8	.....

NOTE.—Stage-discharge relation affected by ice Dec. 1 to Feb. 28; discharge estimated as shown in table of monthly discharge.

Monthly discharge of Deep Creek at Adel, Oreg., for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	51	15	29.8	1,830
November	36	15	18.5	1,100
December	.....	.....	9.0	553
January	.....	.....	8.0	492
February	.....	.....	14.0	778
March	890	15	121	7,440
April	1,600	260	627	37,300
May	825	207	398	24,200
June	191	9.5	55.7	3,310
July	9.5	1.4	4.61	283
August	2.9	2.8	2.85	175
September	6.0	2.4	2.74	163
The year	1,600	1.4	107	77,600

DISMAL CREEK ABOVE BIG VALLEY, NEAR WARNER LAKE, OREG.[1]

LOCATION.—On the section line between secs. 16 and 17, T. 41 S., R. 22 E., at forest ranger's footbridge at proposed point of diversion into head of Twelvemile Creek, 1 mile north of California-Oregon State line, 5 miles above Big Valley, 11 miles north of Fort Bidwell, Calif., and 12 miles southwest of Warner Lake, Lake County.

DRAINAGE AREA.—Not measured.

[1] Published as "Dismal Creek near Fort Bidwell, Calif." in Water-Supply Paper 360.

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RECORDS AVAILABLE.—April 11 to June 17, 1913, and discharge measurements for the year ending September 30, 1919.

GAGE.—Vertical staff on the upstream side of the forest ranger's footbridge, on right bank about one-fourth mile above the dam site.

DISCHARGE MEASUREMENTS.—Made by wading or from the footbridge.

CHANNEL AND CONTROL.—Boulders and loose gravel, permanent. Banks are loose loam and cave in during high water.

DIVERSIONS.—None.

REGULATION.—None.

Discharge measurements of Dismal Creek above Big Valley, near Warner Lake, Oreg., during the period Oct. 1, 1918, to Oct. 2, 1919.

[Made by T. G. Bedford.]

Date.	Discharge.	Date.	Discharge.	Date.	Discharge.
1918.	*Sec.-ft.*	1919.	*Sec.-ft.*	1919.	*Sec.-ft.*
Dec. 14	1.2	May 23	106	July 1	5.5
1919.		June 4	34	Oct. 2	1.0
May 6	51	June 16	13		

DISMAL CREEK NEAR WARNER LAKE, OREG.

LOCATION.—In NE. ¼ SE. ¼ sec. 29, T. 40 S., R. 22 E., at south end of Big Valley, 125 feet above mouth, and 10 miles west of Warner Lake, Lake County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 5 to September 30, 1919, when station was discontinued.

GAGE.—Vertical staff gage fastened to a pine stump on right bank 25 feet above road crossing, and 125 feet above mouth of creek. Read by Miss E. C. Johnson.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Large boulders, permanent. Zero flow, gage height, 0.4 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 2.8 feet, from flood marks, night of May 22 (discharge, 343 second-feet); minimum stage, 0.70 foot; September 12-25 (discharge, 0.3 second-foot).

DIVERSIONS.—Billups ditch with capacity of 3 second-feet and Conlan ditch, divert water for irrigation 500 feet above gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed May 22. Rating curve used May 5–22 well defined between 70 and 100 second-feet; curve used May 23 to September 30, well defined below 160 second-feet. Gage read once daily to hundredths. Daily discharge ascertained by applying gage heights to rating table. Records good.

Discharge measurements of Dismal Creek near Warner Lake, Oreg., during the period Dec. 13, 1918, to Oct. 1, 1919.

[Made by T. G. Bedford.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1918.	*Feet.*	*Sec.-ft.*	1919.	*Feet.*	*Sec.-ft.*	1919.	*Feet.*	*Sec.-ft.*
Dec. 13	.....	1.6	May 6	1.96	72	June 17	1.40	17
1919.			23	2.28	116	30	1.18	9.8
Mar. 25	.....	1.5	June 4	1.77	36	30	1.15	7.4
May 5	2.08	92	5	1.74	36	Oct. 1	.78	.9
			16	1.39	16			

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Daily discharge, in second-feet, of Dismal Creek near Warner Lake, Oreg., for the year ending Sept. 30, 1919.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	.....	a 60	8.5	1.2	a 0.9	16	87	18	3.1	0.8	0.3
2	.....	48	8.0	1.1	a .9	17	a 142	18	2.9	.8	.3
3	.....	a 32	8.5	1.1	a .9	18	198	17	3.1	.8	.3
4	.....	37	7.5	1.1	a .9	19	b 198	18	3.1	.8	.3
5	94	38	7.0	1.0	a .9	20	277	15	2.5	.8	.3
6	92	36	10	.9	a .9	21	256	15	2.4	.8	.3
7	96	a 34	7.0	.9	a .8	22	290	14	2.2	.8	.3
8	a 95	a 33	7.0	.8	.8	23	194	16	2.1	.8	.3
9	a 94	a 32	4.5	.8	.8	24	a 188	15	2.1	.8	.3
10	a 93	a 30	4.5	.8	.7	25	a 181	12	2.2	.8	.3
11	a 92	a 29	4.3	.8	.7	26	175	12	2.1	.8	.5
12	a 91	a 28	4.3	.8	.3	27	a 148	12	2.0	.8	.7
13	a 90	27	4.3	.8	.3	28	a 121	10	2.0	.8	.8
14	a 89	a 24	3.7	.8	.3	29	94	9.5	1.8	.8	.8
15	a 88	22	3.7	.8	.3	30	a 82	9.5	1.6	.9	a .8
						31	a 71	.....	1.3	a .9	.....

a Gage not read; discharge interpolated. b Estimated.

Monthly discharge of Dismal Creek near Warner Lake, Oreg., for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 5-31	290	.....	138	7,390
June	60	9.5	24.0	1,430
July	10	1.3	4.17	256
August	1.2	.8	.86	52.9
September	.9	.3	.57	33.9
The period	.....	.....	.....	9,160

ABERT LAKE BASIN.

CHEWAUCAN RIVER NEAR PAISLEY, OREG.

LOCATION.—In NW. ¼ sec. 34, T. 33 S., R. 18 E., 500 feet above diversion dam of Withers power plant, one-fourth mile above mouth of Mill Creek, three-fourths mile above intake of Conn ditch, and 2½ miles upstream from Paisley, Lake County.

DRAINAGE AREA.—263 square miles (measured on map of Fremont National Forest).

RECORDS AVAILABLE.—November 6, 1912, to September 30, 1920, at gages above Mill Creek. Records at stations giving practically the same yearly run-off are available January 4, 1905, to December 31, 1907, and January 18, 1909, to July 13, 1912.

GAGE.—Lietz water-stage recorder on left bank, belonging to Chewacan Land & Cattle Co. established March 26, 1919. Gage one-fourth mile below, used up to July 18, 1918, and 100 yards below used July 19, 1918, to March 25, 1919. Gages inspected by W. A. Banister.

DISCHARGE MEASUREMENTS.—Made from cable 20 feet below site of water-stage recorder used 1914 to 1918, and adding discharge in power canal, or by wading; fairly good section.

CHANNEL AND CONTROL.—Control for present gage is composed of rock and boulders; for gage used prior to March 26, 1919, it was diversion dam of a power canal, practically permanent during period of record. Bed composed of gravel and boulders.

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EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 2.42 feet at 11 a. m., April 4 (discharge, 750 second-feet); minimum discharge, 13 second-feet at 11 a. m. November 9.

Maximum stage during year ending September 30, 1920, from water-stage recorder, 1.58 feet at noon, May 9 (discharge, 347 second-feet); minimum discharge, 15 second-feet August 20.

1905-1907 and 1909–1920: Maximum stage recorded on old gage half a mile above Paisley, 9.40 feet at 5 p. m., November 23, 1909 (discharge estimated from extension of rating curve as 4,000 second-feet); minimum stage from water-stage recorder 0.44 foot November 11, 1916 (discharge, 9.6 second-feet).

ICE.—Stage-discharge relation seriously affected by ice.

DIVERSIONS.—About 160 acres are shown as irrigated above the station on surveys made by State engineer.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent at both sites. Rating curves fairly well defined. Operation of water-stage recorder satisfactory through 1919, except during portions of the period of ice effect when float was frozen in, and fairly satisfactory through 1920, except from November 26 to January 23 and July 22 to August 28, when clock had stopped. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting the recorder graph. Records good except November, 1918, to February, 1919, February and August, 1920, which are fair, December, 1919, and January, 1920, which are poor on account of severe ice obstruction and lack of gage-height record.

COOPERATION.—Most of the field data furnished by Chewacan Land & Cattle Co.

Discharge measurements of Chewaucan River near Paisley, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 17	Bert Harber [a]	1.05	42.6	Aug. 29	Bert Harber	0.10	17.8
				Sept. 1	J. J. Dirzulaitis	.18	27.3
				26	Bert Harber	.20	19.5
Dec. 23	do	[b] 1.25	30.0	Oct. 30	do	.25	30.3
				Nov. 30	do	[b] .80	39.6
				Dec. 31	do	[b] .85	51
1919.				1920.			
Jan. 29	do	[b] 1.85	54	Jan. 28	do	.50	53
Feb. 24	do	[b] 1.55	60	Mar. 3	do	[b] .25	18.2
24	do	[b] 1.55	54	9	do	.50	[d] 57
Mar. 16	R. C. Briggs	1.11	48.7	25	J. J. Dirzulaitis	.50	52
26	do	[c] 1.73	163	30	Bert Harber	.58	62
Apr. 30	Bert Harber	2.20	649	Apr. 27	do	1.00	168
May 18	Dirzulaitis and Briggs	1.52	323	May 30	do	.90	131
26	Bert Harber	1.65	356	Aug. 8	K. N. Phillips	.06	15.9
June 26	do	.45	49.4	29	Bert Harber	.20	28.5
July 31	do	.20	21.9				

[a] Employee of Chewacan Land & Cattle Co.
[b] Stage-discharge relation affected by ice.
[c] Gage reading of first station. Gage height at new station 1.00 ft.
[d] 46.6 second-feet measured in river; 10 second-feet estimated in Wither's power canal.

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Daily discharge, in second-feet, of Chewaucan River near Paisley, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19												
1	29	39				55	261	570	234	46	25	26
2	33	39				49	252	545	207	44	24	26
3	33	39				51	243	545	184	42	24	26
4	34	42			50	66	570	495	171	39	24	26
5	36	44				60	349	480	166	36	24	26
6	37	42				66	277	433	158	34	24	28
7	37	41				80	210	424	145	34	24	31
8	35	37	50		106	63	189	433	132	34	24	33
9	33	31			340	54	200	424	129	34	24	33
10	31	37		28	300	54	297	389	127	34	24	33
11	31	36			97	49	342	380	119	34	24	31
12	30	36			97	54	284	380	111	34	24	30
13	29	37			88	60	270	357	102	34	24	29
14	29	41			80	63	205	365	97	33	23	28
15	31	47			80	60	219	353	90	32	22	27
16	38	44				76	243	342	84	30	21	27
17	43	39				44	308	335	79	29	21	27
18	41	39				44	353	308	74	28	20	27
19	36	38				60	373	353	70	27	20	27
20	35	37				50	357	342	66	27	20	27
21	35					60	349	342	61	26	20	27
22	35				60	75	353	346	56	26	20	27
23	35		28			111	424	349	54	24	20	27
24	35					111	470	349	53	24	20	27
25	35	35				155	520	342	51	24	20	27
26	35			46		170	438	361	51	24	20	27
27	35					216	461	342	50	24	20	27
28	35					240	510	323	50	24	21	27
29	34				.....	255	520	304	50	24	23	27
30	35				.....	280	545	280	48	26	24	27
31	39	.....			.....	264	.....	270	.....	26	26	.....
1919-20.												
1	23	39			66	37	a 58	204	133	43	19	20
2	24	43			61	30	a 58	158	124	41	19	18
3	26	43			58	18	a 58	168	114	40	19	18
4	30	47			43	20	58	163	103	43	20	18
5	32	49	30		36	25	75	204	107	43	20	20
6	30	44			30	37	99	224	114	39	a 19	18
7	30	39			26	43	114	242	133	34	a 19	21
8	30	33			23	63	114	288	168	30	18	20
9	30	31			27	64	128	328	158	26	a 18	24
10	30	30			30	48	110	317	128	26	a 18	27
11	30	40		45	50	45	71	268	103	24	a 18	24
12	30	31			62	45	82	255	a 104	25	a 18	24
13	30	30	25		70	61	138	236	a 105	27	a 18	24
14	30	33			68	82	119	245	a 106	26	18	24
15	a 30	33			66	75	92	248	107	26	a 18	27
16	a 30	30			64	88	86	248	86	26	a 17	24
17	a 30	30			60	103	82	255	55	26	a 17	23
18	a 30	28			56	a 100	101	264	a 55	26	a 16	21
19	30	26	50		52	a 97	119	248	a 55	24	a 16	20
20	28	24			50	a 94	114	233	55	21	15	20
21	26	a 27			50	92	92	218	61	21	a 16	20
22	31	a 30			40	77	88	210	65	a 20	a 17	21
23	33	34			46	68	92	210	63	a 20	a 18	21
24	a 28	38		79	57	58	65	207	63	a 20	18	21
25	a 23	39		92	60	55	82	190	63	a 20	a 18	21
26	18		55	66	58	55	143	182	55	20	a 18	20
27	28			69	54	50	163	163	45	19	a 18	20
28	31	30		69	48	45	204	148	51	a 19	18	23
29	30			69	42	50	236	148	63	a 18	26	24
30	31			66	.....	64	283	148	a 52	a 18	26	24
31	35	.....		68	.....	58	.....	143	.....	18	24	.....

a Interpolated.

NOTE.—Stage-discharge relation affected by ice Nov. 19, 1918, to Mar. 1, 1919; Mar. 20-22, 1919; Nov. 26, 1919, to Jan. 23, 1920, and Feb. 11 to Mar. 5, 1920; discharge estimated from meter measurements, observer's notes and records of temperature and precipitation. Braced figures show mean discharge for periods indicated.

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Monthly discharge of Chewaucan River near Paisley, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	43	29	34.5	2,120
November	47	31	37.8	2,280
December	.....	.....	38.6	2,370
January	.....	.....	34.4	2,120
February	340	.....	82.8	4,600
March	280	44	99.8	6,140
April	570	180	346	20,600
May	570	270	383	23,600
June	234	48	102	6,070
July	46	24	30.9	1,900
August	26	20	22.4	1,380
September	33	26	27.9	1,660
The year	570	20	103	74,860
1919–20.				
October	35	18	28.9	1,780
November	49	24	34.0	2,020
December	.....	.....	41.1	2,530
January	.....	.....	52.0	3,200
February	66	22	50.1	2,820
March	103	18	59.6	3,660
April	236	58	109	6,480
May	328	143	218	13,400
June	168	45	89.8	5,340
July	43	18	26.7	1,640
August	26	15	18.6	1,140
September	27	18	21.7	1,290
The year	328	15	62.5	45,400

CHEWAUCAN RIVER AT NARROWS, NEAR PAISLEY, OREG.

LOCATION.—In NE. ¼ sec. 24, T. 34 S., R. 19 E., at a constriction in Chewaucan Marsh known as The Narrows, one-eighth mile below lower end of outside canal and 15 miles, by road around north and east sides of marsh, southeast of Paisley, Lake County. Moss Creek enters upper marsh but seldom contributes any water to river.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 18, 1914, to September 30, 1920.

GAGE.—Vertical staff on left bank just below wagon bridge, installed October 22, 1916; gage reader, John Hamilton. Several earlier gages.

DISCHARGE MEASUREMENTS.—Made from wooden wagon bridge or by wading. Bed of dredged channel somewhat rough.

CHANNEL AND CONTROL.—Bed of canal fairly permanent. Stage-discharge relation affected by backwater from dam during part of year.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 3.55 feet April 21 (discharge, 322 second-feet); minimum stage, 0.25 foot August 21–28 and September 5 (discharge, 2 second-feet).

Maximum stage recorded during year ending September 30, 1920, 1.30 feet February 13 (discharge, 67 second-feet); minimum discharge 0.3 second-foot September 23.

1914–1920: Maximum stage recorded, 3.7 feet on ZX gage April 24, 1917 (discharge, 710 second-feet); channel dry, September 8–10, 1915.

ICE.—Stage-discharge relation probably affected by ice.

DIVERSIONS.—About 6,200 acres of uplands and 14,300 acres of marsh hay land are irrigated between the gage above Paisley and this station.

REGULATION.—Discharge varies considerably owing to the manipulation of dams and ditches used for irrigating marsh and bordering lands.

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ACCURACY.—Stage-discharge relation not permanent owing to influence of diversion dam below gage. Five fairly well defined rating curves used during period. No discharge computed for October 1, 1918, to March 23, 1919. Discharge estimated November 21, 1919, to January 23, 1920, February 6, 9, 21, and February 28, to March 5, 1920, on basis of current-meter measurements, records of temperature and precipitation. Daily discharge ascertained by applying the daily gage reading to rating table. Records fair.

COOPERATION.—Results of current-meter measurements and gage readings furnished by Chewacan Land & Cattle Co.

Discharge measurements of Chewaucan River at Narrows near Paisley, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Oct. 16	Bert Harber[a]	0.80	22.2	Jan. 27	Bert Harber	1.25	63
Dec. 27	do	.90	17.2	Mar. 3	do	[b] .70	20.1
1919.				25	J. J. Dirzulaitis	1.05	30.3
Mar. 27	R. C. Briggs	1.88	65	30	Bert Harber	.95	20.1
May 1	Bert Harber	3.05	207	Apr. 28	do	1.15	34.0
18	Briggs and Dirzulaitis	2.60	127	May 29	do	.45	4.2
27	Bert Harber	2.30	121	June 30	do	.20	1.6
Aug. 29	do	.30	2.3	Aug. 7	K. N. Phillips	.52	2.5
Sept. 2	J. J. Dirzulaitis	.35	4.8	29	Bert Harber	.60	5.1
Nov. 30	Bert Harber	[b] .85	17.6				
Dec. 30	do	[b] 1.10	39.6				

[a] Employee of Chewacan Land & Cattle Co. [b] Stage-discharge relation affected by ice.

Daily discharge, in second feet, of Chewaucan River at Narrows, near Paisley, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919.												
1							120	190	111	30	6.0	4.5
2							120	185	102	22	6.0	4.5
3							94	205	94	20	6.0	3.0
4							157	185	90	20	6.0	3.0
5							260	185	90	20	7.5	2.0
6							127	157	86	16	4.5	3.0
7							113	141	78	14	6.0	4.5
8							134	127	71	12	6.0	9.0
9							134	120	64	10	6.0	7.5
10							103	134	64	9.0	6.0	7.5
11							113	157	60	9.0	6.0	6.0
12							82	175	57	12	6.0	6.0
13							66	166	54	14	6.0	6.0
14							63	166	54	14	6.0	9.0
15							31	157	50	12	4.5	9.0
16							40	175	50	14	4.5	9.0
17							45	157	47	12	4.5	9.0
18							78	127	47	10	4.5	10.0
19							103	127	57	12	4.5	9.0
20							141	124	49	12	3.0	9.0
21							322	120	41	9.0	2.0	4.5
22							134	116	33	12	2.0	6.0
23							142	111	30	10	2.0	7.5
24						42	149	111	30	9.0	2.0	6.0
25						40	157	111	28	7.5	2.0	6.0
26						52	166	111	28	7.5	2.0	7.5
27						66	157	120	26	6.0	2.0	7.5
28						72	166	120	24	6.0	2.0	9.0
29						82	166	120	20	6.0	2.0	9.0
30						108	175	120	18	6.0	3.0	9.0
31						103		111		6.0	4.5	

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Daily discharge, in second-feet, of Chewaucan River at Narrows, near Paisley, Oreg., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	12	18			59		26	38	2.7	1.6	2.8	5.0
2	14	22			56		20	26	2.7	1.6	3.9	5.0
3	16	24			52	20	17	50	2.7	1.6	2.8	3.9
4	14	24			52		23	54	2.7	1.6	2.8	2.8
5	14	28			39		20	54	2.7	1.6	2.8	2.8
6	16	26			42	28	20	54	2.4	1.8	2.8	2.8
7	16	22			45	30	26	44	2.4	2.3	2.8	2.8
8	16	16		30	45	33	29	35	2.4	12	2.8	2.0
9	16	20			48	39	29	26	2.4	13	3.9	2.0
10	16	12			52	38	35	28	2.4	10	3.9	2.0
11	16	24	20		63	35	26	29	2.4	8.7	3.9	2.0
12	16	26			59	32	26	23	2.4	8.7	3.9	2.0
13	16	20			67	29	32	20	2.4	7.4	2.8	2.0
14	16	22			59	41	32	17	2.4	8.7	2.8	2.8
15	18	22			42	38	27	14	2.4	7.4	2.8	3.9
16	18	24			39	35	22	12	2.4	7.4	2.8	3.9
17	16	24			48	23	17	12	2.1	8.7	2.0	6.2
18	16	22			45	29	29	12	2.1	7.4	2.0	5.0
19	16	22			39	26	29	12	2.1	6.2	1.3	3.9
20	18	20		40	39	26	29	10	1.8	5.0	.8	3.9
21	18				39	29	26	10	1.8	7.4	.8	2.5
22	18				39	32	26	8.4	1.6	7.4	.8	2.9
23	16	18			56	29	26	8.4	1.4	5.0	.8	.3
24	18			45	48	26	23	8.4	1.4	3.9	.8	1.3
25	16			48	52	29	20	6.7	1.2	2.8	.8	2.6
26	14		34	63	36	29	23	6.7	1.4	2.8	1.8	6.2
27	16			52	21	29	26	6.7	1.4	2.0	2.8	5.0
28	18	20		45	23	23	32	5.4	1.4	2.0	5.0	6.2
29	16			59	22	24	35	4.1	1.4	2.0	5.0	7.4
30	16			59	.....	26	35	4.1	1.4	1.3	5.0	7.4
31	18	.....		59	.....	17	.....	3.4	.....	2.8	5.0	.....

NOTE.—Braced figures show mean discharge for periods indicated.

Monthly discharge of Chewaucan River at Narrows, near Paisley, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919.				
March 24-31	108	40	48.1	763
April	322	31	129	7,680
May	205	111	143	8,790
June	111	18	55.1	3,280
July	30	6.0	12.2	750
August	7.5	2.0	4.35	267
September	10	2.0	6.75	402
The period	.....	.....	.....	21,900
1919-20.				
October	18	12	16.1	990
November	28	12	20.9	1,240
December	.....	.....	25.0	1,540
January	63	.....	38.7	2,380
February	67	21	45.7	2,640
March	41	17	28.2	1,730
April	35	17	26.2	1,560
May	54	3.4	20.7	1,270
June	2.7	1.4	2.08	124
July	13	1.3	5.23	322
August	5.0	.8	2.74	168
September	7.4	.3	3.58	213
The year	67	.3	19.5	14,200

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CHEWAUCAN RIVER AT HOTCHKISS FORD, NEAR PAISLEY, OREG.

LOCATION.—At former river crossing known as Hotchkiss Ford, near line between secs. 11 and 12, T. 35 S., R. 20 E., below lower Chewaucan Marsh, above Crooked Creek, and 20 miles southeast of Paisley, Lake County. Willow Creek enters lower marsh but contributes water to it only when floods early in spring cause it to overflow its banks.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 18, 1914, to September 30, 1920.

GAGE.—Vertical staff on left bank; new gage set 150 feet upstream from old and at different datum on December 27, 1918. Gage reader, John Hamilton.

DISCHARGE MEASUREMENTS.—Made by wading and from plank projecting from a wagon drawn across river by horse on shore, or from a boat.

CHANNEL AND CONTROL.—Dredged canal fairly permanent, but control affected by backwater from dredge operating below gage and growth of aquatic plants.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 4.7 feet April 7 (discharge, 108 second-feet); minimum discharge 1.5 second-feet September 6.

Maximum stage recorded during year ending September 30, 1920, 1.95 feet January 29 (discharge, 72 second-feet); minimum stage 0.30 foot August 30 (discharge estimated, 0.1 second-foot).

1914-1920: Maximum stage recorded 4.55 feet April 26 and 27, 1917 (discharge, 506 second-feet); stream practically dry September 7-17, 1915, and August 2-6, 1918.

ICE.—Stage-discharge relation seriously affected by ice.

DIVERSIONS.—About 7,800 acres of marsh hay land are irrigated between the Narrows and Hotchkiss Ford stations. A total of 28,300 acres is watered from the river above the station.

REGULATION.—Discharge may vary during irrigating season owing to manipulation of dams and ditches for irrigating the marsh.

ACCURACY.—Stage-discharge relation not permanent owing to growth of aquatic plants and operation of dredge near gage. A number of fairly well defined rating curves used. Gage read to half-tenths once a day. Daily discharge ascertained by applying daily gage reading to rating table. Records fair up to July, 1919, poor thereafter.

COOPERATION.—Part of field data furnished by Chewacan Land & Cattle Co.

Discharge measurements of Chewaucan River at Hotchkiss Ford, near Paisley, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 16	Bert Harber [a]	1.05	17.4	Oct. 30	Bert Harber	1.40	29.3
Dec. 27	do	4.00	11.3	Nov. 30	do	.95	7.4
				Dec. 30	do	1.60	34.9
1919.				1920.			
Jan. 31	do	3.77	41.4	Jan. 27	do	1.75	53
Feb. 27	do	3.34	16.2	Mar. 3	do	1.55	27.0
Mar. 27	R. C. Briggs	3.50	51	25	J. J. Dirzulaitis	1.15	6.7
27	Bert Harber	3.50	47.0	30	Bert Harber	1.00	5.5
May 1	do	2.60	30.6	Apr. 28	do	.55	2.1
18	Briggs and Dirzulaitis	4.25	104	May 29	do	.60	3.5
27	Bert Harber	3.65	61	June 30	do	.10	1.0
June 27	do	1.70	6.6	July 31	do	.60	1.4
Aug. 29	do	1.95	1.6	Aug. 7	K. N. Phillips	.40	[b].1
Sept. 2	J. J. Dirzulaitis	2.00	4.3				
25	Bert Harber	.90	6.2				

[a] Employee, Chewacan Land & Cattle Co. [b] Estimated.

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Daily discharge, in second-feet, of Chewaucan River at Hotchkiss Ford, near Paisley Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	2.6	22	.....	.....	.....	.....	36	32	52	8.0		4.2
2	2.6	22	.....	.....	.....	.....	33	37	50	6.5		3.5
3	2.6	22	.....	.....	.....	.....	28	49	52	4.5		2.0
4	2.6	22	.....	.....	.....	.....	36	47	60	4.2		2.0
5	2.6	25	.....	.....	.....	.....	60	49	56	4.0	0.5	2.0
6	11	25	.....	.....	.....	.....	83	41	53	4.0		1.5
7	11	25	.....	.....	.....	.....	108	43	50	3.0		2.8
8	13	25	.....	.....	.....	.....	36	47	50	3.0		2.0
9	13	22	.....	.....	.....	.....	28	55	50	2.0		
10	13	25	.....	.....	.....	.....	17	64	46	2.0		
11	13	28	.....	.....	.....	.....	13	71	40	2.0		
12	13	28	.....	.....	.....	.....	15	81	34	2.5		
13	13	25	.....	.....	.....	.....	16	84	26	4.0		
14	13	.....	.....	.....	.....	.....	13	76	15			
15	13	.....	.....	.....	.....	.....	13	84	11			4
16	15	.....	.....	.....	.....	.....	11	98	11	4.0		
17	15	.....	.....	.....	.....	.....	12	101	10			
18	20	.....	.....	.....	.....	.....	11	106	8.8		2	
19	20	.....	.....	.....	.....	.....	12	78	7.2			
20	20	.....	.....	.....	.....	.....	24	78	6.8	4.0		
21	20	.....	.....	.....	.....	.....	32	75	6.3	3.0		
22	22	.....	.....	.....	.....	.....	40	75	5.8	2.0		
23	22	.....	.....	.....	.....	.....	34	66	5.0	3.0		14
24	22	.....	.....	.....	.....	42	27	54	4.0	2.0		6.0
25	22	.....	.....	.....	.....	42	21	52	4.0	1.0		6.0
26	22	.....	.....	.....	.....	48	24	56	7.2	1.0		5.0
27	22	.....	.....	.....	.....	50	22	58	5.8	1.5		5.0
28	20	.....	.....	.....	.....	27	26	60	5.8	1.0	2.0	6.0
29	22	.....	.....	.....	.....	27	27	58	5.0	1.0	2.8	6.0
30	25	.....	.....	.....	.....	30	27	60	5.0	1.0	3.5	10
31	25	.....	.....	.....	.....	28	.....	54	.....	1.0	3.5	.....
1919–20.												
1	12	23			33	25	4.0	1.9	2.6	1.0	0.7	0.4
2	14	26			30	20	3.3	1.9	2.2	1.0	.4	.4
3	23	40			30	24	3.3	1.8	2.2	1.0	.4	.4
4	18	36			44	16	4.4	1.9	2.2	.6	.2	.4
5	18	44			48	16	3.3	1.9	1.9	.2	.2	.4
6	18	40			48	16	3.6	1.9	1.8	.4	.4	.4
7	18	36	16		44	16	3.6	1.9	1.8	.7	.2	.4
8	18	23		15	24	21	3.6	1.9	1.8	1.0	.2	.4
9	18	18			24	33	3.3	1.9	1.8	1.4	.2	.4
10	18	20			16	14	3.3	2.4	1.8	1.4	.2	.4
11	18	18			14	12	3.6	3.0	1.8	3.2	.2	.7
12	18	23			18	14	4.0	3.0	1.7	2.5	.2	.7
13	20	23			21	16	3.6	3.0	1.6	2.0	.2	.7
14	20	18			30	9	3.6	2.6	1.6	2.5	.2	.4
15	20				26	10	3.5	2.6	1.6	2.0	.2	.7
16	20		10		26	8	3.4	3.0	1.6	2.0	.2	.7
17	18				26	6	3.3	3.0	1.5	2.5	.2	.7
18	16	15			21	9	3.3	3.0	1.6	2.5	.2	.4
19	16			20	33	9	4.0	3.0	1.6	2.5	.2	.7
20	20				16	9	3.0	3.0	1.5	2.5	.2	.7
21	20				12	10	3.3	3.0	1.5	2.5	.2	.7
22	20	14		26	16	6.7	3.0	3.0	1.5	2.5	.2	.7
23	18	10		26	16	6.7	3.0	3.0	1.5	2.5	.2	5.1
24	18			26	14	6.7	3.0	3.0	1.5	2.5	.2	2.5
25	14		34	26	14	6.5	2.6	3.0	1.4	3.2	.2	2.0
26	16	9		44	10	6.3	2.2	3.5	1.3	2.5	.6	3.2
27	14	5		48	16	6.3	2.2	3.5	1.2	2.5	1.0	7.6
28	16	8		44	14	6.3	2.2	3.5	1.1	2.5	.7	6.2
29	20	5		72	30	6.0	2.6	3.5	1.0	2.5	.4	7.6
30	26	6		52	.....	5.7	1.9	3.5	1.0	2.5	.1	9.0
31	16	.....		42	.....	4.0	.....	3.5	.....	1.4	.4	.....

NOTE.—No determination of discharge November 14, 1918, to March 28, 1919. Discharge November 15, 1919, to January 21, 1920, estimated because of ice from meter measurements, observer's notes and record of temperature and precipitation. Braced figures show mean discharge for periods indicated.

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Monthly discharge of Chewaucan River at Hotchkiss Ford, near Paisley, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	25	2.6	15.3	941
November 1-13	28	22	24.3	627
March 24-31	50	28	36.8	584
April	108	11	29.5	1,760
May	106	32	64.2	3,950
June	60	4.0	24.7	1,470
July	8.0	1.0	3.07	189
August	3.5	0.5	1.74	107
September	14	1.5	4.47	266
1919-20.				
October	26	12	18.0	1,110
November	44	5	19.1	1,140
December	.....	.....	22.4	1,380
January	72	.....	24.2	1,490
February	48	10	24.6	1,420
March	33	4.0	12.1	744
April	4.4	1.9	3.23	192
May	3.5	1.8	2.73	168
June	2.6	1.0	1.64	98
July	3.2	.2	1.94	119
August	1.0	.1	.30	18
September	9.0	.4	1.83	109
The year	72	.1	11.0	7,990

CONN DITCH NEAR PAISLEY, OREG.

LOCATION.—In SE. ¼ sec. 27, T. 33 S., R. 18 E., just below road crossing, half a mile below intake of ditch, and 2 miles southwest of Paisley, Lake County.

RECORDS AVAILABLE.—July 17, 1914, to September 30, 1920.

GAGE.—Vertical staff on right side of ditch about 100 feet below road bridge. Readings previous to April 29, 1919, referred to staff on left bank about 40 feet below bridge. Gage reader, W. A. Banister.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Ditch not particularly well built or maintained; control somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 1.5 feet May 21 (discharge, 16 second-feet).

Maximum stage recorded during year ending September 30, 1920, 1.1 feet, May 14, 19-21, and June 1 (discharge, 10 second-feet).

1914-1920: Maximum stage recorded, 1.75 feet July 20, 1914 (discharge, 19 second-feet). Canal dry at times.

ICE.—Water generally turned out of canal during extreme cold weather.

ACCURACY.—Stage-discharge relation not permanent. Fairly well defined rating curves applicable as follows: October 1 to December 17, 1918, and September 10 to November 15, 1919, May 13 to June 10, and June 11 to September 9, 1919. Well-defined curve used May 1 to September 30, 1920. Gage read daily to half-tenths. Daily discharge ascertained by applying daily gage readings to rating table. Records good.

COOPERATION.—Most of the gage readings and meter measurements furnished by Chewacan Land & Cattle Co.

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Conn ditch diverts from Chewaucan River in SE. ¼ sec. 27, T. 33 S., R. 18 E., three-eighths mile below the gaging station just above Mill Creek. The water is used for irrigating 600 acres of the Conn ranch on a bench northwest of Paisley.

Discharge measurements of Conn ditch near Paisley, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
May 18	Dirzulaitis and Briggs	1.01	8.0	Mar. 24	J. J. Dirzulaitis	0.22	0.5
26	Bert Harber [a]	1.15	9.8	May 30	Bert Harber	1.00	7.6
June 26	do	.90	4.8	June 29	do	.75	3.7
July 31	do	.70	3.1	July 31	do	.60	2.4
Aug. 29	do	.60	2.6	Aug. 8	K. N. Phillips	.60	2.3
Sept. 1	J. J. Dirzulaitis	.70	3.8	29	Bert Harber	.38	.8
26	Bert Harber	.40	.8				

[a] Employee, Chewacan Land & Cattle Co.

Daily discharge, in second-feet, of Conn ditch near Paisley, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	May.	June.	July.	Aug.	Sept.
1918–19.								
1	0.4	0.5		.....	9.2	4.6	3.4	3.0
2	.5	.5		.....	9.2	4.6	3.4	3.0
3	.5	.4		.....	9.2	4.2	3.4	3.0
4	.5	.5		.....	12	4.2	3.4	3.0
5	.5	.5		.....	12	4.2	3.4	3.0
6	.5	.5		.....	14	3.8	3.4	3.0
7	.5	.5		.....	13	3.8	3.4	5.1
8	.5	.5		.....	13	3.4	3.4	5.1
9	.5	.5		.....	12	3.4	3.4	5.1
10	.5	.5	0.7	.....	13	3.4	3.4	.8
11	.5	1.1		.....	9.8	3.4	3.4	.8
12	.5	1.1		.....	9.0	3.4	3.4	.8
13	.5	1.1		1.4	11	3.4	3.0	.8
14	.5	1.1		1.4	9.8	3.4	3.0	.8
15	.5	1.1		2.8	9.8	3.4	3.0	.8
16	.5	1.1		7.7	9.0	3.0	3.0	.8
17	.5	1.1		7.7	9.0	3.0	2.7	.8
18	.5	1.1	.....	7.0	8.3	3.4	2.7	.6
19	.5	1.1	.....	8.4	7.6	3.0	2.7	.6
20	.5	1.1	.....	7.7	7.6	3.0	2.7	.5
21	.5	1.1	.....	16	6.9	2.7	2.7	.6
22	.5	1.1	.....	11	6.9	2.7	2.7	1.0
23	.5	1.1	.....	11	6.9	2.7	2.7	1.0
24	.5	1.1	.....	12	6.2	2.7	2.7	1.0
25	.5	1.1	.....	10	6.2	2.7	2.7	1.0
26	.5	1.1	.....	10	5.1	2.4	2.7	1.0
27	.5	1.1	.....	10	5.1	2.1	2.7	1.0
28	.5	1.1	.....	10	5.1	2.1	2.7	.8
29	.5	1.1	.....	10	4.6	3.0	2.7	.8
30	.5	.8	.....	9.2	4.6	3.0	2.7	.8
31	.5	.....	.....	9.2	.....	3.4	2.7	.....

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Daily discharge, in second-feet, of Conn ditch near Paisley, Oreg., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	May.	June.	July.	Aug.	Sept.
1919-20.								
1	0.8	C1.1	.....	0.9	10	3.2	1.9	0.9
2	.8	1.0	.....	1.2	6.6	2.8	1.9	.7
3	.8	1.0	.....	2.8	6.6	3.2	1.9	.9
4	.8	1.0	.....	2.8	6.6	2.8	1.9	.9
5	.8	.8	.....	2.3	6.6	2.3	1.9	.9
6	.8	.8	.....	2.8	6.6	1.9	2.3	.7
7	.8	.8	.....	2.8	5.6	1.5	2.3	.7
8	.8	.6	.....	4.3	6.6	1.5	2.3	.7
9	.8	.6	.....	5.0	6.6	1.2	2.3	.7
10	.8	.6	.....	5.6	6.6	.9	2.3	.9
11	.8	.6	.....	7.6	6.6	.9	2.8	1.2
12	.8	.5	.....	7.6	6.6	.7	2.8	1.5
13	.8	.4	.....	7.6	6.6	.7	2.8	1.5
14	.8	.2	.....	10	8.8	.7	2.8	1.5
15	.8	.....	.....	7.6	8.8	.7	2.8	1.5
16	.8	.....	.....	7.6	8.8	.7	2.8	1.5
17	.8	.....	.....	7.6	8.8	.9	2.8	.9
18	.8	.....	.....	7.6	7.6	2.8	2.3	.9
19	.8	.....	.....	10	7.6	2.8	2.8	.9
20	.8	.....	.....	10	5.6	2.8	2.8	.9
21	.8	.....	.....	10	4.3	2.8	.5	.9
22	.8	.....	.....	8.8	4.3	2.8	.5	.9
23	1.0	.....	.....	8.8	4.3	2.3	.5	.9
24	1.0	.....	.....	7.6	3.2	2.3	.4	.9
25	1.0	.....	.....	7.6	3.2	2.3	.7	.9
26	.8	.....	.....	8.8	3.2	2.3	1.2	.9
27	.8	.....	.....	7.6	3.2	2.3	1.2	.9
28	.8	.....	.....	6.6	3.2	1.9	.7	.9
29	1.0	.....	.....	7.6	3.2	2.3	.9	.9
30	1.1	.....	.....	7.6	3.2	1.9	.9	.9
31	1.1	.....	.....	7.6	.....	1.9	.9	.....

NOTE.—Canal dry during periods for which no discharge is given.

Monthly discharge of Conn ditch near Paisley, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	0.5	0.4	0.50	31
November	1.1	.4	.89	53
December 1-17	.....	.....	[a] .70	24
May 13-31	16	1.4	8.55	322
June	14	4.6	8.84	526
July	4.6	2.1	3.27	201
August	3.4	2.7	3.01	185
September	5.1	.5	1.68	100
The year	16	0	1.99	1,440
1919-20.				
October	1.1	.8	.84	52
November 1-14	1.1	.2	.71	20
May	10	.9	6.53	402
June	10	3.2	5.98	356
July	3.2	.7	1.94	119
August	2.8	.4	1.84	113
September	1.5	.7	.98	58
The year	10	.2	1.54	1,120

[a] Estimated.

NOTE.—Canal dry Dec. 18, 1918, to May 12, 1919, and Nov. 15, 1919, to Apr. 30, 1920.

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SMALLS CREEK AT PAISLEY, OREG.

LOCATION.—In SW. ¼ sec. 24, T. 33 S., R. 18 E., in western part of Paisley, Lake County, just above road bridge, 200 yards below point of diversion from Chewaucan River, and same distance above headgate of Bagley ditch.

RECORDS AVAILABLE.—January 18, 1914, to September 30, 1920.

GAGE.—Vertical staff on left bank; read by W. A. Banister.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—A natural stream channel, narrow, with well-defined banks, fairly straight, with gravel bed; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 2.1 feet May 9 (discharge, 94 second-feet); minimum stage, 0.6 foot November 25, 26, December 9 and 10 (discharge, 2.0 second-feet).

Maximum stage recorded during year ending September 30, 1920, 1.9 feet May 22 and 23 (discharge, 59 second-feet); no flow November 27.

1914–1920: Maximum stage recorded, 2.2 feet May 15, 1914 (discharge, 107 second-feet); no flow November 27, 1919.

ICE.—Stage-discharge relation seriously affected by ice December 18, 1918, to March 10, 1919, and November 8–10, December 1–18, December 26, 1919, to January 20, 1920, and February 16–23.

ACCURACY.—Stage-discharge relation somewhat unstable up to February, 1920. Five fairly well defined rating curves used. Gage read to half-tenths once a day. Daily discharge ascertained by applying daily gage reading to rating table. Records good except for periods of ice effect.

COOPERATION.—Part of field data furnished by Chewacan Land & Cattle Co.

Smalls Creek is a natural slough or defluent of Chewaucan River and has been converted into an irrigation canal. It diverts water from the river in SW. ¼ sec. 24, T. 33 S., R. 18 E., and irrigates 2,417 acres of the alluvial fan of Chewaucan River above the upper marsh, including 1,209 acres watered from Bagley ditch, which diverts water from Smalls Creek a short distance from the river. The irrigation season extends from about April 1 to September 15. Water is diverted at other times for watering stock. Surplus and return waters find their way to the marsh.

Discharge measurements of Smalls Creek at Paisley, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 17	Bert Harber [a]	0.85	5.8	Sept. 26	Bert Harber	1.00	12.9
Dec. 23	do	[b] .90	3.9	Oct. 30	do	.70	3.8
				Dec. 31	do	[b] .85	6.4
1919.				1920.			
Jan. 29	do	[b] .85	3.7	Jan. 28	do	.75	4.5
Feb. 24	do	[b] .80	5.1	Mar. 3	do	.65	3.0
Mar. 16	R. C. Briggs	.79	6.7	30	do	.80	6.8
Apr. 30	Bert Harber	1.65	60	Apr. 27	do	1.40	32.9
30	do	1.65	60	May 30	do	1.60	48.2
May 19	Briggs and Dirzulaitis	1.86	74	June 29	do	1.20	23.4
26	Bert Harber	1.95	71	July 31	do	.90	10.9
June 26	do	1.00	13.0	Aug. 28	K. N. Phillips	.87	9.4
July 31	do	.95	10.2	29	Bert Harber	1.00	15.7
Aug. 29	do	[c] .90	7.4				
Sept. 1	J. J. Dirzulaitis	.90	11.2				

[a] Employee of Chewacan Land & Cattle Co.
[b] Stage-discharge relation affected by ice.
[c] Gage height questionable; if correct, stage was changing rapidly.

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Daily discharge, in second-feet, of Smalls Creek at Paisley, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	15	3.8	3.8				6.0	62	35	23	8	10
2	17	3.0	3.8				6.0	54	38	23	8	15
3	17	3.0	3.0				11	62	35	23	8	15
4	6.2	3.8	3.8				54	54	44	23	8	15
5	6.2	3.8	3.8			7	7.0	50	44	23	8	15
6	6.2	3.0	3.8				16	47	44	23	8	15
7	6.2	3.0	3.8				16	86	44	20	8	12
8	6.2	3.0	3.0				16	90	41	18	8	15
9	8	3.0	2.0				27	94	38	18	8	15
10	8	3.8	2.0				16	82	41	18	8	18
11	6.2	3.0	2.5			11	16	70	35	16	8	15
12	6.2	2.5	3.8			11	14	70	32	13	8	15
13	6.2	2.5	3.8			11	11	62	26	13	13	15
14	6.2	2.5	3.8			11	11	70	26	13	13	18
15	6.2	2.5	3.8		6	9	11	50	26	13	13	18
16	6.2	2.5	13	4		7.0	14	54	23	13	13	18
17	6.2	2.5	13			7.0	47	50	20	13	8	18
18	3.0	3.0				7.0	40	66	16	10	8	18
19	3.0	3.0				7.0	40	70	13	10	13	15
20	3.0	3.0				7.0	40	74	13	10	13	15
21	3.0	3.8				9	33	74	8	8	13	15
22	3.0	4.5				11	40	86	8	8	13	15
23	3.0	3.8				14	54	90	8	8	8	15
24	3.0	3.8	5			16	54	78	8	8	8	15
25	3.0	2.0				16	54	67	8	8	8	15
26	3.0	2.0				14	51	70	13	8	8	15
27	3.0	3.0				18	54	64	23	8	8	15
28	3.0	3.0				11	58	64	23	8	8	15
29	3.8	3.0			.....	6.0	58	56	23	8	8	15
30	3.8	3.8			.....	6.0	58	47	23	8	9	15
31	3.8	.....			.....	6.0	.....	38	.....	9	9	.....
1919–20.												
1	12	3.8			2.1	3.0	11	42	39	25	11	11
2	10	3.8			3.0	3.0	11	42	39	27	11	11
3	10	3.8	5		2.1	3.0	11	42	36	27	11	13
4	10	3.8			.6	2.1	11	46	36	25	11	13
5	12	3.8			.4	2.1	13	49	34	22	8.8	13
6	12	3.8			.4	5.2	18	49	34	20	11	11
7	4.9	3.8			.3	6.6	20	49	34	20	11	11
8	4.9			2.5	.2	11	25	49	32	15	11	11
9	3.8	2			.1	11	27	52	32	11	11	11
10	3.8				.1	20	29	52	32	8.8	13	11
11	3.8	6.0			.2	.3	25	34	29	8.8	13	11
12	3.8	3.8	1		2.1	.6	20	27	29	6.6	13	11
13	4.9	3.0			3.0	3.8	29	39	29	5.2	13	11
14	6.0	1.5			3.8	6.6	34	42	29	5.2	11	13
15	8.0	.9			3.8	5.2	25	46	42	11	11	15
16	8.0	.9			5.4	3.8	20	46	39	11	11	15
17	10	.9			8.8	3.0	20	49	36	6.6	11	11
18	10	.9		8	9.0	3.8	25	49	34	6.6	11	11
19	10	.9	6.0		10	5.2	34	49	29	6.6	11	11
20	10	.9	8.0		11	5.2	34	46	27	15	11	11
21	12	.9	10	15	10	5.2	32	44	25	15	13	15
22	12	2.1	10	2.1	7.0	15	32	59	20	15	13	15
23	12	3.0	10	3.8	5.2	15	32	59	18	11	13	15
24	12	2.1	10	6.6	.9	11	34	52	18	11	15	1.5
25	12	3.0	8.0	8.8	.9	11	34	34	15	11	18	1.5
26	12	.1		2.1	1.5	11	34	52	15	11	27	1.5
27	10	.0		2.1	2.1	11	34	44	20	11	25	1.5
28	15	2.1	4	5.2	2.1	11	44	44	20	8.8	15	1.5
29	15	6.0		6.6	3.8	11	46	44	20	11	11	3.0
30	3.0	6.0		2.1	.....	15	44	44	25	11	11	3.0
31	3.0	.....	6.4	2.1	.....	11	.....	42	.....	11	11	.....

NOTE.—Braced figures show mean discharge for periods indicated.

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Monthly discharge of Smalls Creek at Paisley, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	17	3.0	5.93	365
November	4.5	2.0	3.10	184
December	.....	2.0	4.73	291
January	.....	.....	4.0	246
February	.....	.....	6.0	333
March	18	.....	9.19	565
April	58	6.0	31.1	1,850
May	94	38	66.2	4,070
June	44	8.0	26.0	1,550
July	23	8.0	13.7	842
August	13	8.0	9.35	575
September	18	10	15.3	910
The year	94	.....	16.3	11,[illegible]
1919–20.				
October	15	3.0	8.90	547
November	6.0	0	2.50	154
December	10	.....	4.08	251
January	15	.....	4.32	266
February	11	.1	3.44	198
March	20	.3	7.47	459
April	46	11	26.9	1,600
May	59	27	45.7	2,810
June	42	15	28.9	1,720
July	27	5.2	13.2	812
August	27	8.8	12.8	787
September	15	1.5	9.82	584
The year	59	0	14.1	10,200

BAGLEY DITCH AT PAISLEY, OREG.

LOCATION.—In SW. ¼ sec. 24, T. 33 S., R. 18 E., just below head gate, in Paisley, Lake County.

RECORDS AVAILABLE.—January 18, 1914, to September 30, 1920.

GAGE.—Vertical staff on left bank; read by W. A. Banister.

DISCHARGE MEASUREMENTS.—Made by wading or from plank across ditch at gage.

CHANNEL AND CONTROL.—Earth channel; control unstable.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 2.45 feet May 23 (discharge, 48 second-feet).

Maximum stage recorded during year ending September 30, 1920, 2.55 feet May 23 (discharge, 65 second-feet).

1914-1920: Maximum stage recorded, 2.5 feet May 15, 1914 (discharge, 68 second-feet); canal dry during periods in each year.

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation changed several times during 1919 and 1920 by manipulation of flashboards below gage. Several fairly well defined curves used. Gage read once a day to half-tenths. Daily discharge ascertained by applying daily gage readings to rating table. Records good, except those for periods of ice effect, which are fair.

COOPERATION.—Field data furnished by Chewacan Land & Cattle Co.

gley ditch (sometimes called Brattain ditch) diverts water from Smalls Creek V. ¼ sec. 24, T. 33 S., R. 18 E., a few hundred yards below the point where Smalls k diverts from Chewaucan River, extends 6 miles in a southerly direction, and ates 1,209 acres lying above the area watered by Smalls Creek. Return and waste

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waters reach upper Chewaucan Marsh. The irrigation season extends from late in March or early in April to about September. Water is diverted for stock most of the year.

Discharge measurements of Bagley ditch at Paisley, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 17	Bert Harber [a]	1.00	4.5	Sept. 26	Bert Harber	1.30	6.7
Dec. 23	do	[b] 1.10	2.6	Oct. 30	do	1.05	1.4
1919.				1920.			
Mar. 16	R. C. Briggs	.84	3.8	Mar. 23	J. J. Dirzulaitis	.85	3.6
Apr. 30	Bert Harber	1.85	26.8	30	Bert Harber	.75	1.7
30	do	1.85	28.9	Apr. 27	do	1.75	18.8
May 19	Briggs and Dirzulaitis	2.31	43.3	May 30	do	2.05	32.6
26	Bert Harber	2.35	41.4	June 29	do	1.85	17.0
June 26	do	1.40	10.4	July 31	do	1.30	5.4
July 31	do	1.30	8.7	Aug. 8	K. N. Phillips	1.30	6.6
Aug. 29	do	1.10	4.5	29	Bert Harber	1.42	11.2
Sept. 1	J. J. Dirzulaitis	1.15	5.4				

[a] Employee of Chewacan Land & Cattle Co. [b] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Bagley ditch at Paisley, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	11	3.1	3.4				2.8	39	9.8	12	8.5	5.6
2	13	3.1	3.4			4	2.8	32	14	11	8.5	6.3
3	13	2.8	3.4				5.0	36	12	11	9.8	6.3
4	3.8	3.1	3.8			5.0	29	30	24	9.8	9.8	6.3
5	3.8	3.1	3.8			5.0	3.4	30	24	9.8	9.8	6.3
6	3.8	2.8	3.8			5.8	12	28	23	8.5	9.8	5.6
7	3.8	2.8	3.8			4.4	12	39	23	7.4	11	5.6
8	5.0	2.8	3.4			5.0	12	39	22	11	9.8	6.3
9	5.0	2.8	3.4			5.0	17	41	22	11	9.8	5.2
10	5.0	3.0	3.4			5.0	12	39	23	11	9.8	6.4
11	5.0	2.8	3.4			5.0	11	39	20	11	11	5.2
12	5.0	3.1	3.8			5.0	9.6	37	18	11	11	4.5
13	5.0	2.8	3.4			4.4	9.6	37	17	11	12	5.2
14	5.0	2.8	3.4			4.4	9.6	39	17	11	12	6.4
15	5.0	2.8	3.4	2	3	3.4	9.6	34	17	11	11	6.4
16	5.0	2.8	6.5			3.4	8.3	32	14	11	9.8	6.4
17	5.0	2.8	6.5			3.4	18	30	12	11	8.5	3.4
18	3.4	3.1				3.1	18	41	11	9.8	8.5	4.2
19	3.4	3.1				3.1	18	38	9.8	12	9.8	3.4
20	3.4	3.1				3.4	18	37	9.8	12	9.8	4.2
21	3.4	3.1				3.4	17	39	7.4	11	8.5	4.2
22	3.4	3.4				3.4	20	46	5.6	9.8	8.5	3.4
23	3.4	3.4				5.0	22	48	5.6	9.8	7.4	3.4
24	3.4	3.4	2.5			5.0	22	41	4.8	8.5	7.4	4.2
25	3.4	2.5				5.8	26	41	4.8	8.5	7.4	5.4
26	3.4	2.2				6.5	23	41	11	8.5	5.6	6.6
27	3.4	1.9				6.5	29	39	17	7.4	4.8	6.6
28	3.4	1.9				3.4	32	39	17	7.4	4.8	6.6
29	3.4	1.9			.....	2.8	34	36	17	7.4	4.8	5.4
30	3.4	2.5			.....	2.8	28	26	14	7.4	4.8	4.2
31	3.4	.....			.....	2.8	.....	12	.....	8.5	4.8	.....

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Daily discharge, in second-feet, of Bagley ditch at Paisley, Oreg., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	4			1	0	0	4	25	28	17	5	9
2	4			1	0	0	4	25	25	18	5	9
3	4			1	0	0	4	25	23	18	5	10
4	4			1	0	0	4	28	21	16	5	10
5	4			2	0	0	5	30	21	14	5	10
6	5			2	0	0	9	32	21	12	4	9
7	1			2	0	1	10	32	21	6	7	8
8	1			2	0	2	16	35	18	4	7	8
9	1			2	0	8	18	44	18	4	7	8
10	1			2	0	7	23	44	18	3	8	9
11	1			2	0	12	21	1	15	2	8	9
12	1			2	0	0	9	0	15	2	8	8
13	1			2	0	1	15	30	15	2	8	8
14	1			5	1	2	18	54	14	2	7	8
15	1			4	1	2	10	50	18	8	7	9
16	1	1	1	3	1	2	10	54	18	10	6	9
17	1			3	2	0	10	54	16	8	7	8
18	4			3	2	1	10	50	16	8	8	9
19	4			3	2	2	20	47	14	8	8	8
20	4			4	2	2	18	47	12	11	8	7
21	5			5	2	2	18	44	9	11	9	9
22	5			1	2	5	15	61	8	10	9	10
23	5			3	2	4	16	65	6	9	8	10
24	5			3	0	4	18	54	5	8	9	7
25	6			3	0	4	20	41	5	9	10	6
26	5			0	0	4	20	54	5	8	19	6
27	5			0	0	4	20	41	6	8	18	6
28	6			0	0	4	25	38	6	6	10	6
29	6			0	0	4	30	32	15	6	9	7
30	1			0	.....	3	30	32	17	6	8	7
31	1	.....		0	.....	5	.....	30	.....	6	8	.....

NOTE.—Discharge, Dec. 18, 1918, to Mar. 3, 1919, Mar. 9 and 10, 1919, estimated because of ice. Braced figures show mean discharge for periods indicated.

Monthly discharge of Bagley ditch at Paisley, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	13	3.4	4.83	297
November	3.4	1.9	2.83	168
December	.....	.....	3.26	200
January	.....	0	[a] 2.00	123
February	.....	.....	[a] 3.00	167
March	6.5	2.8	4.30	264
April	34	2.8	16.4	976
May	48	12	36.3	2,230
June	24	4.8	14.9	887
July	12	7.4	9.92	610
August	12	4.8	8.67	533
September	6.6	3.4	5.31	316
The year	48	0	9.35	6,770
1919-20.				
October	6	1	3.2	194
November	.....	.....	[a] .5	18
December	.....	.....	[a] .3	18
January	5	0	2.0	123
February	2	0	.6	34
March	12	0	2.7	168
April	30	4	15.0	892
May	65	.....	38.7	2,380
June	28	5	15.0	892
July	18	2	8.4	516
August	19	4	8.1	492
September	10	6	8.2	490
The year	65	0	8.57	6,220

[a] Estimated.

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JONES-INNIS-ZX DITCH NEAR PAISLEY, OREG.

LOCATION.—In NW. ¼ sec. 19, T. 33 S., R. 19 E., 100 yards below intake and 1 mile east of Paisley, Lake County.

RECORDS AVAILABLE.—July 20, 1914, to September 30, 1920.

GAGE.—Vertical staff read by W. A. Banister.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage or by wading.

CHANNEL AND CONTROL.—Channel excavated in gravel and firm soil; control fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 3.05 feet May 2 (discharge, 131 second-feet); minimum discharge, 0.2 second-foot March 18 and 19.

Maximum stage recorded during year ending September 30, 1920, 2.77 feet May 12 (discharge, 87 second-feet); canal dry August 24.

1914–1920: Maximum stage recorded 3.25 feet June 10, 1917 (discharge, 193 second-feet); canal dry at times.

ICE.—Stage-discharge relation evidently affected by ice.

ACCURACY.—Stage-discharge relation not permanent in 1919; practically permanent throughout 1920; affected by ice from December 23, 1918, to March 4, 1919, and November 8 to 10, December 2 to 7, 27, 28, 1919, January 1 to 20 and February 16 to 21, 1920, discharge estimated from study of temperature record and observer's notes. Rating curves well defined. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage reading to rating table except April 16 to 20, and June 8 to 20, 1919, when indirect method was used. Records fair.

COOPERATION.—Most of field data furnished by Chewacan Land & Cattle Co.

Jones-Innis-ZX ditch (so-called from the largest water users under it, ZX being the common name of Chewacan Land & Cattle Co.'s ranch) diverts water from Chewaucan River in NW. ¼ sec. 19, T. 33 S., R. 19 E., in natural sloughs, from which is irrigated an area of 2,219 acres of the lowest part of the alluvial fan of Chewaucan River immediately above the upper marsh. One of these (Paisley slough) at its lower end discharges into the "stock ditch" which is used for irrigation and watering cattle. The irrigation season extends from early in April to about July 1. Water is diverted practically the entire year for either irrigation or stock.

Discharge measurements of Jones-Innis-ZX ditch near Paisley, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Mar. 16	R. C. Briggs	0.56	0.4	Mar. 26	J. J. Dirzulaitis	0.75	2.8
Apr. 30	Bert Harber [a]	2.95	113	Apr. 27	Bert Harber	1.52	22.7
30	do	2.95	113	May 29	do	2.22	53
May 18	Dirzulaitis and Briggs	2.80	90	June 29	do	1.32	14.1
26	Bert Harber	2.85	96	Aug. 8	K. N. Phillips	.52	[b] .4
June 26	do	1.50	24.1				
Sept. 1	J. J. Dirzulaitis	.62	1.6				

[a] Employee Chewacan Land & Cattle Co. [b] Estimated.

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Daily discharge, in second-feet, of Jones-Innis-ZX ditch near Paisley, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	2.5	3.2	4.0				0.4	122	56	16	1.4	1.8
2	2.5	2.5	4.0			2.5	.4	131	56	16	1.4	1.8
3	2.5	2.0	4.0				1.0	122	49	14	1.4	1.8
4	2.5	2.0	4.0				5.5	122	78	14	1.4	1.8
5	2.5	2.0	4.0			2.5	3.2	122	78	2.6	1.4	1.8
6	2.5	2.0	4.0			2.5	1.4	105	46	2.6	1.4	1.8
7	2.5	2.0	4.0			1.4	2.0	105	73	2.6	1.0	2.2
8	2.5	2.0	3.2			1.4	4.0	114	49	2.6	1.0	2.2
9	2.5	2.0	3.2			1.4	5.5	122	46	2.6	1.0	2.2
10	2.5	2.5	3.2			1.0	7.5	114	52	2.6	1.0	2.2
11	2.5	2.5	3.2			.6	7.5	90	49	2.6	1.0	2.2
12	2.5	2.5	3.2			.4	6.5	84	46	2.6	1.0	2.2
13	2.5	2.5	3.2			.4	6.5	78	46	2.6	1.0	2.2
14	2.5	2.5	3.2			.4	5.5	105	40	2.6	1.0	2.2
15	2.5	2.5	3.2		3.0	.4	5.5	105	43	2.2	1.0	2.2
16	2.5	2.5	2.5	2.5		.4	2.5	105	40	2.2	1.0	2.2
17	2.5	2.5	2.5			.4	32	98	40	2.2	.4	2.2
18	1.0	2.5	2.5			.2	32	90	43	2.2	.4	2.2
19	1.0	2.5	2.5			.2	26	90	40	2.2	.4	2.2
20	2.0	2.5	2.5			.4	23	84	40	2.2	.4	2.2
21	2.0	2.5	2.5			.4	60	84	36	1.8	.4	1.8
22	2.0	2.5	2.5			.6	64	105	36	1.8	.4	2.2
23	2.0	2.5				.6	68	114	36	1.8	.4	2.2
24	2.0	2.5				1.0	73	105	36	1.8	.4	2.2
25	2.0	2.5				.6	90	98	38	1.8	.4	2.2
26	2.0	2.5	2.5			1.0	78	98	24	1.8	.4	2.2
27	2.0	2.5				1.0	90	98	20	1.8	.4	2.2
28	2.0	2.5				1.0	98	98	16	1.4	1.0	2.2
29	2.5	2.5			.....	.6	98	90	16	1.4	1.0	2.2
30	2.5	2.5			.....	.6	114	78	16	1.4	1.0	1.8
31	2.5	.....			.....	.6	.....	60	.....	1.4	1.0	.....
1919-20.												
1	1.0	2.1			9.0	4.4	7.9	51	47	11	.2	.1
2	1.0	2.1			9.0	4.4	7.9	51	45	10	.2	.1
3	1.0	2.1			9.0	4.4	7.9	51	45	11	.2	.1
4	1.0		1.0	0.5	7.9	4.4	7.9	51	45	10	.2	.1
5	1.0	1.6			1.8	4.4	10	55	43	9.0	.2	.2
6	1.0				2.4	5.1	10	59	43	9.0	.2	.1
7	1.0	1.0			2.4	6.0	10	61	43	7.9	.2	.1
8	1.0		.1		2.4	7.9	14	70	43	7.9	.1	.1
9	1.0	1.0	1.0		1.8	10	14	78	45	6.9	.1	.2
10	1.0		0		1.8	9.0	16	82	45	6.0	.1	.2
11	1.0	1.0	.3		1.8	10	12	82	42	4.4	.1	.1
12	1.0	.6	1.0		1.8	9.0	9.0	87	40	3.7	.1	.1
13	1.0	.3	1.0	.2	2.4	10	12	82	38	3.0	.1	.1
14	1.0	.6	2.1		2.4	11	12	78	36	3.0	.1	.2
15	1.0	1.0	2.1		2.4	7.9	10	82	33	3.0	.1	.2
16	1.0	1.0	2.1			7.9	10	82	31	3.0	.1	.2
17	1.6	1.0	1.6			10	10	78	31	2.4	.1	.2
18	1.6	1.0	2.1			10	14	78	29	2.4	.1	.1
19	1.6	1.0	2.1	1.0	2.4	11	12	74	26	2.4	.1	.1
20	1.6	1.0	2.1			11	14	70	22	1.8	.1	.1
21	1.6	1.0	2.1	2.1		11	16	70	19	1.2	.1	.2
22	1.6	1.0	2.1	2.8	4.4	12	16	67	16	.4	.1	.2
23	1.6	2.1	2.1	4.3	4.4	12	16	64	14	.4	.1	.2
24	1.6	1.0	2.1	5.1	4.4	10	19	61	12	.4	0	.4
25	1.6	1.6	2.1	6.0	4.4	10	22	59	12	.2	.1	.4
26	1.0	.1	1.6	7.9	4.4	10	22	61	11	.2	.8	.4
27	1.0	1.0	1.0	7.9	4.4	10	24	57	10	.2	.2	.4
28	1.0	1.6	1.0	7.9	4.4	10	42	51	10	.2	.2	.4
29	1.6	1.6	2.1	9.0	4.4	11	51	51	10	.2	.1	.4
30	2.1	1.6	1.0	9.0	.....	12	55	49	11	.2	.1	.4
....	2.1	.....	1.6	10	.....	11	.....	49	.....	.2	.1	.....

aced figures show mean discharge for periods indicated.

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Monthly discharge of Jones-Innis-ZX ditch near Paisley, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	2.5	1.0	2.26	139
November	3.2	2.0	2.41	143
December	4.0	.....	3.02	186
January	.....	.....	[a] 2.5	154
February	.....	.....	[a] 3.0	167
March	2.5	.2	1.03	63
April	114	.4	33.7	2,010
May	131	60	101	6,210
June	78	16	42.7	2,540
July	16	1.4	3.79	233
August	1.4	.4	.86	53
September	2.2	1.8	2.09	124
The year	131	.....	16.6	12,000
1919-20.				
October	2.1	1.0	1.26	77
November	2.1	.1	1.20	71
December	2.1	.1	1.40	86
January	10	.2	2.60	160
February	9.0	1.8	3.72	214
March	12	4.4	8.93	549
April	55	7.9	16.8	1,000
May	87	49	65.8	4,050
June	47	10	29.9	178
July	11	.2	3.92	241
August	.8	0	.14	9
September	.4	.1	.20	12
The year	87	0	9.15	6,650

[a] Estimated.

SILVER LAKE BASIN.

SILVER CREEK NEAR SILVER LAKE, OREG.

LOCATION.—In SW. ¼ sec. 28, T. 28 S., R. 14 E., near diversion point of proposed project of Silver Lake Irrigation District, 1½ miles southwest of Silver Lake post office, Lake County, and 3 miles above mouth of Bridge Creek.

DRAINAGE AREA.—221 square miles.

RECORDS AVAILABLE.—December 29, 1904, to March 31, 1907; January 11, 1909, to September 30, 1920.

GAGE.—Stevens 8-day water-stage recorder installed March 24, 1919, referred to inclined staff on right bank; vertical staff on right bank, 10 feet upstream, used April 5, 1912, to July 23, 1915; inclined staff at location of present gage, 1905 to 1912, and July, 1915, to March, 1919. Gage reader, J. H. Gowdy.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Composed of rocks and gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 4.35 feet at 1 a. m. April 5 (discharge, 406 second-feet); minimum stage from water-stage recorder, 0.17 foot at 1 a. m. August 26 (discharge, 0.8 second-foot).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 2.40 feet at 5 p. m. May 9 (discharge, 137 second-feet); minimum stage from water stage recorder, 0.03 foot at 8 p. m. August 7 (discharge, 0.4 second-foot).

1905-1907 and 1909-1920: Maximum stage recorded, 6.40 feet at 4 p. m. November 23, 1909 (discharge, 910 second-feet); minimum discharge 0.3 second-foot August 30, September 2 and 6, 1918.

ICE.—Stage-discharge relation slightly affected by ice during 1919, not seriously affected during 1920.

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Diversions.—A few small tracts irrigated above the station, chiefly in Thompson Valley.

Regulation.—Some water stored in a small reservoir in Thompson Valley.

Accuracy.—Stage-discharge relation practically permanent during 1919; changed slightly during winter of 1919–20. Rating curves well defined. Operation of water-stage recorder satisfactory except for short periods; not used November 23, 1919 to March 20, 1920. Inclined gage read three times a week prior to March 24, 1919, and twice a week December 28, 1919 to March 20, 1920. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting the recorder graph or the daily gage reading. Records good for periods when water-stage recorder operated satisfactorily except those for low stages in 1920 which are fair; others poor.

Discharge measurements of Silver Creek near Silver Lake, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Mar. 13	R. C. Briggs	0.26	3.3	Mar. 21	J. J. Dirzulaitis	1.43	59
29	do	1.50	58	Apr. 24	do	.62	13.2
Apr. 17	do	3.24	225	May 20	F. F. Henshaw	1.30	49
May 15	Dirzulaitis and Briggs	1.34	45.6	July 14	Phillips and Marvin	.21	[a] .6
June 7	J. J. Dirzulaitis	.72	12.8	Aug. 4	K. N. Phillips	.12	[a] 1.0
Aug. 28	do	.22	1.1				

[a] Estimated.

Daily discharge, in second-feet, of Silver Creek near Silver Lake, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1				1.9	3.6	3.0	154	180	20	11	2.3	1.3
2		1.2		1.8	2.8	3.0	180	164	18	11	2.4	1.3
3				1.7	2.8	3.0	169	143	16	10	2.6	1.2
4		1.6			2.8	5.6	323	124	14	9.2	2.8	1.4
5	1.6				3.0	8.3	265	106	13	9.5	2.8	1.9
6					3.2	6.7	134	92	13	9.5	2.8	3.2
7	.6				3.5	5.1	96	83	12	8.6	2.5	3.9
8				1.0	29	3.5	103	78	12	8.3	2.2	3.5
9		1.6	2.8		54	3.5	109	74	12	7.4	2.0	
10	1.0				40	3.5	186	68	12	7.7	1.7	
11		1.6			25	3.5	252	61	12	6.1	1.7	3.0
12			2.8		10	2.8	210	57	12	4.5	1.6	
13				1.7	3.5	2.8	198	53	12	3.2	1.7	
14	1.0	2.0		3.0	4.0	2.8	124	51	12	3.2	1.6	
15			2.8	4.3	4.5	3.2	116	47	16	2.6	1.5	2.3
16				5.6	5.0	3.5	148	46	18	2.4	1.5	2.1
17				6.9	5.5	3.5	204	41	18	1.9	1.5	2.0
18	1.0		2.8	9.8	5.6	3.8	245	38	16	1.8	1.4	2.1
19				12	5.5	4.1	231	37	14	2.0	1.4	2.0
20			2.8	9.8	5.0	4.5	192	36	13	2.1	1.5	2.0
21	1.0			9.8	5.0	4.9	180	35	12	2.0	1.6	2.0
22			2.8	10	4.5	24	169	34	12	1.9	1.6	2.0
23				9.8	4.5	17	192	32	10	1.5	1.6	2.0
24	1.0			9.8	4.5	10	174	31	10		1.9	2.0
25				9.8	4.5	9.8	169	27	10		1.4	2.4
26			2.3	6.9	4.0	13	138	27	12	1.8	1.1	1.9
27				6.2	3.5	23	138	26	14		1.3	1.8
28				5.6	3.5	37	169	25	15		1.2	2.0
29	1.2			5.2		64	186	23	14		1.3	2.1
30			2.3	4.8		111	186	22	11		1.3	2.3
31				4.5		143		22		2.3	1.0	

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Daily discharge, in second-feet, of Silver Creek near Silver Lake, Oreg., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	2.6	2.6			8.4	2.8	15	39	15	4.0		2.0
2	3.0	4.3				2.8	11	38	15	3.8	1.0	1.5
3	3.0	4.1			7.2	3.0	10	39	14	4.2		1.0
4	3.0	4.7				3.2	10	41	12	4.8	1.0	1.3
5	3.0	4.9	2.0		6.0	3.5	14	50	12	4.2	.6	.7
6	3.2	4.3			6.0	5.4	28	60	12	3.5	.4	.6
7	3.3	3.2			6.0	7.2	30	74	12	3.0	.4	.6
8		3.0		3.0	6.0	9.0	30	84	11	2.6	.7	.7
9		2.6				8.0	30	110	10	2.4	1.0	1.2
10		3.0				7.0	32	107	11	2.2	1.4	1.5
11	3.0	3.7			6.3	6.0	26	91	11	1.8	.8	2.0
12		4.3					31	82	11	1.9		2.6
13		4.0			6.6	10	35	76	10	2.1		3.2
14		3.6			6.6		32	65	10	2.2		3.5
15	2.6	3.3	1.0		6.6	15	23	57	15	2.0		3.5
16		3.3					20	50	14			2.8
17		3.0		4.0	6.3	20	23	44	12			2.2
18	2.6	3.0					26	41	11	1.8		1.6
19		3.7		6.0	6.0	25	32	46	10			1.5
20		2.3			5.6	38	27	50	9		1.0	1.5
21	2.6	2.1		6.0	5.2	50	20	47	8.1	1.5		1.5
22	2.6	2.0			4.8	35	16	36	7.2	1.6		2.0
23	2.8					22	15	24	6.6	1.5		2.6
24	2.6			6.0		18	14	22	6.6	1.8		
25				7.5	4.1	17	16	21	6.6	1.9		
26	2.8	2.0	4.0			14	22	20	5.8	1.5		2.0
27				10	3.5	12	28	20	5.2			
28	3.0				3.0	9.4	30	17	4.8			
29	3.3			13	3.0	9.4	41	15	4.2	1.0	1.8	
30	3.7			10	.....	14	40	15	4.0		1.5	2.3
31	2.9	.....		10	.....	17	.....	15	.....		1.5	.....

NOTE.—Gage read only on days for which discharge is given, Oct. 1 to Dec. 31, 1918. Discharge estimated for following periods: Jan. 1, 2, 4–12, 14–16, 24, 27, 29, 30, Feb. 1, 3, 5, 6, 8, 10–12, 14–17, 19–21, 23, 25–27, Mar. 1, 2, 4, 6, 7, 9, 10, 13, 15, 18, 19, July 24–30, Aug. 8, 9, Sept. 9–14, 21, 22, Oct. 8–14, 16–20, 25–27, Nov. 13, 14, Nov. 23, 1919, to Jan. 18, 1920, Jan. 20–23, 26–28, 30, 31, Feb. 2–4, 6, 7, 9–12, 14, 16–18, 20, 21, 23–26, 28, 29, Mar. 1, 3, 4, 6, 7, 9, 10, 12–20, Apr. 17, May 19, 24, June 7, 18–20, July 12, 13, 16–20, 27–31, Aug. 1–3, 12–28, Sept. 12, and 24–29. Braced figures show mean discharge for periods indicated.

Monthly discharge of Silver Creek near Silver Lake, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	.....	.....	1.05	65
November	.....	.....	[a] 1.60	95
December	.....	.....	[a] 2.60	160
January	12	.....	4.84	298
February	.....	.....	9.01	500
March	143	2.8	17.3	1,060
April	323	96	178	10,600
May	180	22	60.7	3,730
June	20	10	13.5	803
July	11	1.5	4.59	282
August	2.8	1.0	1.77	109
September	.....	1.2	2.29	136
The year	323	.....	24.7	17,800

[a] Estimated.

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Monthly discharge of Silver Creek near Silver Lake, Oreg., for the years ending Sept. 30, 1919 and 1920—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919-20.				
October	3.7	.....	2.89	178
November	4.9	.....	3.03	180
December	.....	.....	2.39	147
January	13	.....	5.27	325
February	8.4	.....	5.73	330
March	50	2.8	13.6	836
April	41	10	24.2	1,440
May	110	15	48.3	2,970
June	15	4.0	9.87	587
July	4.8	.....	2.21	136
August	.....	.4	1.00	61
September	3.5	.6	1.86	111
The year	110	.4	10.0	7,300

WEST FORK OF SILVER CREEK NEAR SILVER LAKE, OREG.

LOCATION.—In sec. 8, T. 29 S., R. 14 E., half a mile above mouth of West Fork and 7 miles southwest of Silver Lake post office, Lake County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 21 to August 31, 1919, and March 21 to July 31, 1920.

GAGE.—Stevens 8-day water-stage recorder installed April 24, 1920, on left bank, replacing the Stevens continuous recorder used before that date; inspected by J. H. Gowdy.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and small boulders, fairly permanent, banks covered with brush.

EXTREMES OF DISCHARGE.—Maximum stage during periods of records from water-stage recorder, 1.63 feet at 10 p. m. March 27, 1919 (discharge, 65 second-feet); minimum stage from water-stage recorder, 0.37 foot July 27, 1920 (discharge, 1.1 second-feet).

ICE.—Stage-discharge relation affected by ice during part of each day March 21–29, 1919. No ice effect during 1920.

DIVERSION.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent except for a change during period of no record in winter of 1919–20. Rating curves well defined for range of stage. Operation of water-stage recorder satisfactory, except for a few short periods. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting the recorder graph. Records good.

Discharge measurements of West Fork of Silver Creek near Silver Lake, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Mar. 21	R. C. Briggs	[a] 0.65	4.1	Mar. 21	J. J. Dirzulaitis	0.74	11.8
24	do	.63	5.2	23	do	.46	2.0
29	do	.90	15.7	Apr. 22	do	.42	1.9
Apr. 22	do	.90	19.5	May 22	F. F. Henshaw	.69	10.5
May 15	Briggs and Dirzulaitis	1.00	21.8	July 14	K. N. Phillips	.46	2.9
June 7	J. J. Dirzulaitis	.73	9.4	Aug. 4	do	.38	1.1
Aug. 29	do	.49	1.9				

[a] Stage-discharge relation affected by ice.

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Daily discharge, in second-feet, of West Fork of Silver Creek near Silver Lake, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	1919						1920				
	Mar.	Apr.	May.	June.	July.	Aug.	Mar.	Apr.	May.	June.	July.
1	.....	18	34	14	6.2	1.7	.....	3.0	9.0	6.5	3.5
2	.....	18	37	12	6.2	1.7	.....	3.0	7.9	6.2	3.8
3	.....	16	37	11	5.9	1.7	.....	3.5	7.6	5.9	3.8
4	.....	29	35	10	5.9	1.7	.....		7.9	5.6	3.8
5	.....	22	32	10	5.2	1.7	.....		9.0	5.9	3.5
6	.....	16	30	10	4.8	1.7	.....	4.0	9.3	6.2	2.7
7	.....		29	10	4.5	1.7	.....		11	5.9	2.7
8	.....		30	9.5	4.5	1.7	.....		12	5.9	2.7
9	.....	16	30	9.0	4.0	1.8	.....		14	5.9	2.7
10	.....		27	9 0	3.5	2.0	.....		13	5.3	2.5
11	.....		24	8.0	3.8	1.8	.....	4.1	12	4.7	2.3
12	.....	17	22	8.0	3.2	2.0	.....	4.1	12	4.7	2.1
13	.....	16	22	8.0	2.8	2.0	.....	2.9	12	5.0	2.5
14	.....	13	22	8.0	2.8	2.0	.....	2.9	12	5.3	3.1
15	.....	13	22	8.0	2.5	2.0	.....	3.3	12	6.5	2.9
16	.....	15	21	7.6	2.5	1.8	.....	2.5	12	5.3	2.7
17	.....	19	20	7.3	2.2	1.8	.....	2.9	12	5.0	2.5
18	.....	22	18	7.0	2.5	1.8	.....	4.1	12	5.3	2.3
19	.....	22	18	6.2	2.5	1.8	.....		10	5.0	1.7
20	.....	20	18	6.2	2.5	2.0	.....	3.0	9.3	6.2	1.5
21	5	18	19	5.9	2.8	1.8	8.0		9.3	4.1	1.5
22	6	18	19	5.9	3.0	2.0	4.0	1.9	9.3	4.1	1.5
23	7	20	19	5.6	3.5	2.0	2.0	2.7	9.0	4.1	1.5
24	8	22	18	5.6	3.0	2.0		3.5	8.6	3.8	1.4
25	9	24	17	5.2	3.0	2.0		5.0	8.2	3.5	1.4
26	12	22	17	5.6	2.8	2.0		6.5	7.2	3.5	1.3
27	26	20	16	7.0	2.5	2.0	2.0	8.6	6.8	3.5	1.1
28	29	22	16	7.0	2.0	2.0		9.6	6.5	3.3	
29	22	25	16	6.2	2.0	2.0		11	6.2	3.4	1.2
30	20	29	15	6.2	2.0	2.0		9.6	6.4	3.5	
31	17	.....	14	.....	1.8	2.0		.....	6.5	.....	

NOTE.—Discharge estimated for following periods for which no gage-height record is available: Mar. 22, 23, and Apr. 7–11, 1919; Mar. 22, 24–31, Apr. 1, 2, 4–10, 19–21, 23, May 30, June 8, 29, and July 28–31, 1920. Braced figures show mean discharge for periods indicated.

Monthly discharge of West Fork of Silver Creek near Silver Lake, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919.				
March 21–31	29	5	14.6	318
April	29	13	19.2	1,140
May	37	14	23.0	1,410
June	14	5.2	7.97	474
July	6.2	1.8	3.43	211
August	2.0	1.7	1.88	116
The period	37	1.7	11.3	3,670
1920.				
April	11	2.5	4.39	261
May	14	6.2	9.68	595
June	6.5	3.3	4.97	296
July	3.8	1.1	2.25	138
The period	14	1.1	5.33	1,290

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BUCK CREEK NEAR SILVER LAKE,[1] OREG.

LOCATION.—In sec. 22, T. 28 S., R. 13 E., at Deadmond ranch, 100 yards north of bridge on Klamath Falls road and 7 miles west of town of Silver Lake, Lake County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 21, 1905, to July 19, 1906; January 20, 1909, to September 24, 1910; March 13, 1919, to August 20, 1920; also some fragmentary records in 1911.

GAGE.—Vertical staff on left bank, directly back of Deadmond house; read by B. J. Deadmond. Inclined staff in sec. 17, T. 28 S., R. 14 E., about 4 miles downstream used 1905 to 1910.

DISCHARGE MEASUREMENTS.—Made by wading near gage, and from head gate about 1 mile above gage.

CHANNEL AND CONTROL.—Channel narrow and crooked. Banks overgrown with willows and subject to overflow at stage of 4 feet. Control not well defined.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 4.1 feet at 10 a. m. May 29 (discharge, 120 second-feet); minimum stage 0.46 foot at time of measurement August 28 (discharge, 2.7 second-feet).

Maximum stage recorded during year ending September 30, 1920, 2.90 feet at 1 p. m. May 30 and 7 a. m. May 31 (discharge, 66 second-feet); minimum stage, 0.49 foot at 5 p. m. August 1 and 3 (discharge, 2.8 second-feet).

1905–6, 1909–10, and 1919–20: Maximum stage recorded 10.0 feet on old gage, at 8 p. m. February 24, 1910 (discharge from extension of rating curve, 409 second-feet); minimum discharge 2.5 second-feet, December 11 and 12, 1906. The flood of February, 1907, reached a stage corresponding to 6.6 feet on present gage according to observer (discharge, from extension of rating curve, 450 second-feet).

ICE.—No record during periods of ice.

DIVERSIONS.—Three small ranches are irrigated from the creek above the station. Deadmond's ditch also diverts around the gage; it has been measured and an estimate made of the quantity of water diverted.

REGULATION.—None.

ACCURACY.—Stage-discharge relation fairly permanent; gathering of drift on overhanging brush may occasionally cause temporary backwater. Rating curve fairly well defined. Gage read to half-tenths, twice a day during high stages, once a day during low stages. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair except December, 1919, to February, 1920, which are poor.

Discharge measurements of Buck Creek near Silver Lake, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.		Date.	Made by—	Gage height.	Discharge.	
			Buck Creek.	Deadmond ditch.				Buck Creek.	Deadmond ditch.
1919.		*Feet.*	*Sec.-ft.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*	*Sec.-ft.*
Mar. 13	R. C. Briggs	1.00	7.5	0	Mar. 19	J. J. Dirzulaitis	0.72	6.6	0.5
30	do	1.40	15.9	[a]1.0	Apr. 22	do	.68	4.1	0
Apr. 15	do	.97	8.6	[a].2	May 22	F. F. Henshaw	2.35	45.0	2.5
May 14	Dirzulaitis and Briggs	2.02	35.7	([b])	July 14	K. N. Phillips	.83	5.0	2.4
June 7	J. J. Dirzulaitis	2.56	43.7	3.3	Aug. 4	do	.52	3.2	1.6
Aug. 28	do	.46	2.6	2.1					

[a] Estimated. [b] Not measured.

[1] Published in previous reports as "Bear Creek near Silver Lake."

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Daily discharge, in second-feet, of Buck Creek near Silver Lake, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.										
1	.....	.....	.....	.....	16	21	95	20	8.0	4.5
2	.....	.....	.....	.....	14	22	54	20	8.0	4.5
3	.....	.....	.....	.....	16	22	54	20	6.5	4.5
4	.....	.....	.....	.....	21	22	54	18	6.0	5.5
5	.....	.....	.....	.....	16	26	62	18	5.5	5.5
6	.....	.....	.....	.....	11	26	54	17	5.5	5.5
7	.....	.....	.....	.....	12	28	54	15	5.5	5.5
8	.....	.....	.....	.....	11	32	50	15	5.5	6.5
9	.....	.....	.....	.....	9	34	45	15	5.5	5.5
10	.....	.....	.....	.....	11	27	42	15	5.5	5.5
11	.....	.....	.....	.....	11	32	38	16	5.5	5.5
12	.....	.....	.....	.....	13	30	32	15	5.5	5.5
13	.....	.....	.....	8	12	30	28	15	5.5	5.5
14	.....	.....	.....	10	10	40	30	13	5.5	5.5
15	.....	.....	.....	11	9	42	22	12	5.5	5.5
16	.....	.....	.....	12	10	34	22	11	5.5	5.5
17	.....	.....	.....	12	11	32	24	10		6.0
18	.....	.....	.....	13	11	34	22	10		6.5
19	.....	.....	.....	10	12	47	26	6.5		6.5
20	.....	.....	.....	12	12	54	24	6.5	5.5	6.5
21	.....	.....	.....	10	12	70	24	6.5		6.5
22	.....	.....	.....	21	11	86	20	5.5		6.5
23	.....	.....	.....	20	12	95	18	5.5		6.5
24	.....	.....	.....	18	14	90	17	6.0	5.5	5.5
25	.....	.....	.....	21	14	90	17	6.5	5.5	5.5
26	.....	.....	.....	21	12	100	17	6.5	5.5	5.5
27	.....	.....	.....	33	12	110	22	8.0	5.5	5.5
28	.....	.....	.....	30	12	115	21	10	3.5	5.5
29	.....	.....	.....	26	14	115	20	10	4.5	5.5
30	.....	.....	.....	17	17	95	20	9.0	4.5	5.5
31	.....	.....	.....	18	.....	95	.....	8.0	4.5	.....
1919-20.										
1	5.5	6.5	4.5	6.0	5.8	6.6	58	8.4	2.9	.....
2	5.5	6.5	5.5	6.0	5.5	6.6	24	10	2.9	.....
3	5.5	6.5	5.5	11	6.0	6.0	24	9.6	2.9	.....
4	5.5	6.5	5.5	9.0	6.1	6.0	30	9.2	3.2	.....
5	5.5	6.5	4.5	7.2	6.0	6.0	33	7.8	3.2	.....
6	6.5	5.5	4.5	6.5	6.0	8.0	32	7.4	3.0	.....
7	5.5	5.5	.....	6.0	6.3	13	28	7.2	3.0	.....
8	5.5	4.5	.....	5.5	6.3	14	30	6.3	3.2	.....
9	5.5	5.5	.....	6.0	6.0	18	32	4.7	3.5	.....
10	5.5	5.5	.....	6.0	6.3	15	32	5.1	3.5	.....
11	5.5	6.5	.....	6.5	5.1	14	26	5.3	3.5	.....
12	5.5	6.5	.....	5.0	5.0	18	24	4.7	3.5	.....
3	5.5	8.0	.....	6.0	6.5	21	24	5.4	3.5	.....
14	6.5	8.0	.....	8.0	6.1	21	27	5.7	3.5	.....
15	6.5	6.5	.....	9.0	6.2	27	38	5.5	3.5	.....
16	6.5	6.5	.....	9.0	6.2	28	27	5.3	3.5	.....
17	5.5	6.5	.....	6.0	5.0	38	30	5.3	3.5	.....
18	5.5	5.5	.....	6.5	5.5	58	30	4.7	3.5	.....
19	5.5	5.5	.....	5.6	5.7	38	30	4.5	3.5	.....
20	6.5	5.5	.....	6.0	6.1	54	27	3.7	3.5	.....
21	6.5	5.5	.....	5.8	5.0	54	24	3.9	.....	.....
22	6.5	6.5	.....	6.1	5.1	48	27	4.0	.....	.....
23	6.5	6.5	.....	6.2	5.0	48	16	4.0	.....	.....
24	8.0	6.5	.....	6.1	5.5	38	14	3.6	.....	.....
25	8.0	6.5	.....	6.3	5.1	13	14	3.5	.....	.....
26	8.0	6.5	.....	6.3	5.8	9.0	14	3.6	.....	.....
27	8.0	5.5	.....	6.3	6.3	32	14	3.4	.....	.....
28	6.5	5.5	.....	6.1	6.8	18	12	3.0	.....	.....
29	6.5	4.5	.....	6.3	7.7	14	9.6	2.9	.....	.....
30	6.5	4.5	.....	5.5	7.2	62	9.6	3.0	.....	.....
31	6.5	.....	.....	6.1	.....	66	.....	2.9	.....	.....

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Monthly discharge of Buck Creek near Silver Lake, Oreg., and Deadmond's ditch for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.		
	Maximum.	Minimum.	Mean.	Creek.	Ditch.[a]	Total.
1919.						
March 13–31	33	8	17.0	640	20	660
April	21	9	12.6	750	30	780
May	115	21	54.7	3,360	120	3,480
June	95	17	34.3	2,040	180	2,220
July	20	5.5	11.9	732	150	882
August	8	3.5	5.55	341	120	461
September	6.5	4.5	5.65	336	60	396
The period				8,200	680	8,880
1919–20.						
October	8.0	5.5	6.18	380	0	380
November	8.0	4.5	6.07	361	0	361
December			[a] 4	246	0	246
January			[a] 6	369	0	369
February			[a] 6	345	0	345
March	11	5.5	6.58	405	30	435
April	7.7	5.0	5.91	352	30	382
May	66	6.0	26.4	1,620	100	1,720
June	58	9.6	25.3	1,500	150	1,650
July	10	2.9	5.28	325	150	475
August 1–20	3.5	2.9	3.32	132	60	192
The period				6,040	520	6,560

[a] Estimated.

MALHEUR AND HARNEY LAKES BASIN.

SILVIES RIVER NEAR BURNS, OREG.

LOCATION.—In sec. 7, T. 22 S., R. 30 E., at wagon bridge on Parker ranch, 12 miles northwest of Burns, Harney County.

DRAINAGE AREA.—940 square miles (measured on map prepared by U. S. Reclamation Service).

RECORDS AVAILABLE.—May 10, 1903, to July 24, 1906; December 14, 1908, to September 30, 1920.

GAGE.—Inclined and vertical staff on left bank; datum raised 2.04 feet August 11, 1918. Gurley printing water-stage recorder on left bank, about 1¼ miles up stream and 1 mile above Sylvester's ranch in sec. 31, T. 21 S., R. 30 E., used December, 1911, to June 20, 1917.

DISCHARGE MEASUREMENTS.—Made from wagon bridge at gage, cable 1 mile upstream, or by wading.

CHANNEL AND CONTROL.—Low-water control is a gravel riffle about 25 feet below gage. Probably shifts in high water. Above gage height 13 feet river overflows its banks near the gage and begins cutting across the bends, with no defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 12.0 feet, April 5, 21, and 22 (discharge, 1,450 second-feet); minimum stage, 0.25 foot, August 24 to September 6 (discharge, 8 second-feet).

Maximum stage recorded during year ending September 30, 1920, 10.6 feet at 6 p. m. January 28 (discharge, 1,020 second-feet); water below zero on gage July 4 and 5 (discharge estimated 1 second-foot).

1904–1906 and 1909–1920: Maximum stage recorded, 17.12 feet on original datum April 15, 1904 (discharge, 4,730 second-feet); minimum discharge estimated 1 second-foot July 4 and 5, 1920.

ICE.—Stage-discharge relation not seriously affected by ice.

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DIVERSIONS.—A large area of land in the headwaters of Silvies River is irrigated with flood water.

REGULATION.—Flow at lower station occasionally affected by operation of Sylvester's dam half a mile above.

ACCURACY.—Stage-discharge relation changed during winter of 1918–19, probably about February 11. Rating curves used before and after the change fairly well defined. Gage read to tenths twice a day during high stages, to half-tenths once a day during low water. Daily discharge ascertained by applying mean daily gage height to rating table. Records considered good, except for January and February, 1919, for which they are fair.

Discharge measurements of Silvies River near Burns, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Mar. 19	F. F. Henshaw	0.70	47.1	Sept. 9	J. J. Dirzulaitis	[b]1.37	124
19	do	.70	43.1				
30	J. J. Dirzulaitis	10.85	[a]925	1920.			
Apr. 6	do	11.50	[a]922	Apr. 15	do	6.13	515
14	do	11.28	1,150	15	do	6.15	513
19	do	11.20	1,260	May 12	W. C. Hammatt	6.90	590
27	do	11.72	1,300	Aug. 16	V. H. Reineking	.20	5.5
May 29	do	1.60	121				

[a] Overflow not included. [b] Mean gage height uncertain.

NOTE.—Hammatt and Reineking, engineers for Harney basin irrigation district.

Daily discharge, in second-feet, of Silvies River near Burns, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	10	16	25	13	20	39	1,240	920	104	16	10	8
2	10	16	25	13	20	39	960	848	96	16	10	8
3	10	16	25	13	20	39	884	800	84	16	10	8
4	13	16	20	13	20	39	1,020	712	76	16	10	8
5	13	16	20	13	20	39	1,450	623	72	16	10	8
6	16	16	20	10	20	39	1,300	587	72	16	10	8
7	16	16	20	10	20	39	1,120	533	72	16	10	10
8	13	20	20	8	20	39	860	470	54	16	10	10
9	13	20	20	8	20	34	701	416	54	16	10	35
10	10	20	20	8	86	34	650	398	39	16	10	10
11	10	20	20	10	200	34	836	380	39	16	10	10
12	10	20	20	10	112	34	1,000	362	34	16	10	10
13	10	20	20	10	96	39	1,150	344	34	16	10	10
14	10	20	20	10	80	39	1,210	326	34	16	10	24
15	13	20	20	10	72	39	1,120	299	34	13	10	24
16	16	20	20	10	72	34	950	272	34	13	10	24
17	16	25	20	10	64	44	920	263	29	13	10	54
18	16	25	20	10	64	44	980	245	29	10	10	54
19	16	25	20	13	54	44	1,180	168	24	10	10	54
20	16	25	20	13	54	54	1,360	168	24	10	10	54
21	16	25	20	13	44	64	1,450	152	24	10	10	54
22	16	25	16	13	44	96	1,450	112	24	10	10	54
23	16	25	16	16	44	152	1,400	112	24	10	10	54
24	16	25	16	16	44	254	1,400	112	24	10	8	54
25	16	25	16	16	44	245	1,450	112	24	10	8	54
26	16	25	16	16	39	236	1,450	128	24	10	8	54
27	16	25	13	20	39	362	1,360	136	24	10	8	54
28	16	25	13	20	39	596	1,240	136	24	10	8	54
29	16	25	13	25	.....	896	1,090	128	16	10	8	54
30	16	25	13	25	.....	1,120	965	112	16	10	8	54
31	16	.....	13	20	.....	1,400	.....	104	.....	10	8	.....

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Daily discharge, in second-feet, of Silvies River near Burns, Oreg., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	54	24	20	29	290	59	184	623	136	88	6	6
2	64	24	16	29	236	68	209	623	108	88	6	6
3	64	24	16	29	227	96	209	605	80	72	6	6
4	64	24	16	24	184	104	209	587	64	1	6	6
5	64	24	16	24	168	112	227	551	49	1	6	6
6	64	29	16	16	152	112	236	524	68	3	6	6
7	64	29	16	16	136	112	236	506	72	3	6	6
8	64	34	16	16	108	112	308	506	72	6	6	6
9	64	34	16	13	88	112	398	515	72	6	6	6
10	64	34	16	13	88	104	416	596	80	6	6	6
11	64	34	16	13	88	96	470	605	80	6	6	6
12	64	34	16	13	80	104		587	80	6	6	6
13	59	34	16	13	80	112		542	80	6	6	6
14	59	34	16	13	80	128		479	64	6	6	6
15	44	34	16	13	76	152	515	416	54	6	6	6
16	44	34	16	13	72	144	524	335	44	10	6	6
17	24	34	16	13	64	136	560	290	44	6	6	6
18	24	34	16	16	64	128	416	272	44	6	6	5
19	24	34	16	16	64	120	407	236	44	6	6	4
20	24	34	16	16	64	128	398	272	44	6	6	3
21	24	34	24	16	64	136	425	218	44	6	6	4
22	24	34	29	24	59	152	434	160	44	6	6	5
23	24	34	34	88	54	160	371	192	39	6	6	5
24	24	34	34	168	44	168	344	200	34	6	6	6
25	24	29	39	308	36	160	353	200	34	6	6	7
26	24	24	44	443	34	176	371	236	34	6	6	8
27	24	16	44	800	34	192	362	254	24	6	6	8
28	24	16	39	1,020	34	200	479	236	24	6	6	8
29	24	16	34	650	34	184	578	227	16	6	6	8
30	24	20	34	506	.....	168	605	209	6	6	6	8
31	24	.....	29	380	.....	152	.....	184	.....	6	6	.....

Monthly discharge of Silvies River near Burns, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	16	10	14.0	861
November	25	16	21.4	1,270
December	25	13	18.7	1,150
January	25	8	13.4	824
February	200	20	52.5	2,920
March	1,400	34	200	12,300
April	1,450	650	1,140	67,800
May	920	104	338	20,800
June	104	16	42.1	2,510
July	16	10	13.0	799
August	10	8	9.5	584
September	54	8	32.4	1,930
The year	1,450	8	157	114,000
1919–20.				
October	64	24	42.7	2,630
November	34	16	29.2	1,740
December	44	16	22.8	1,400
January	1,020	13	153	9,410
February	290	34	96.6	5,560
March	200	59	132	8,120
April	605	184	388	23,100
May	623	160	387	23,800
June	136	6	55.9	3,330
July	88	1	13.0	799
August	6	6	6.0	369
September	8	3	6.0	357
The year	1,020	1	111	80,600

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WEST FORK OF SILVIES RIVER NEAR LAWEN, OREG.

LOCATION.—In SW. ¼ sec. 24, T. 25 S., R. 32 E., at Crowley Bridge, one-fourth mile from Herman Ruh's house and 5 miles southeast of Lawen, Harney County.

DRAINAGE AREA.—Indeterminate.

RECORDS AVAILABLE.—March 31 to July 1, 1916, April 15 to July 11, 1917, April 9 to June 2, 1919, when station was discontinued.

GAGE.—Vertical staff on abutment of bridge. Gage reader, Frank A. Ruh.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Channel deep at bridge and bends to left just above it. Old Crowley dam acts as a partial control; but stage-discharge relation is also affected by slope of river below dam.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of records in 1919, 8.15 feet May 4 and 5 (discharge, 330 second-feet). Flow practically ceases during summer.

ICE.—No record during period when stream was frozen.

DIVERSIONS.—Many thousand acres of hay land irrigated from flood water above this point. East Fork diverts water about a mile southeast of Burns, the main channel below the bifurcation being known as West Fork.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Rating curves used as follows: April 10 to May 4, fairly well defined; May 5–25 poorly defined. Gage read once a day to half-tenths. Daily discharge ascertained by applying daily gage reading to rating table. Records fair.

Discharge measurements of West Fork of Silvies River near Lawen, Oreg., during the year ending Sept. 30, 1919.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 25	F. F. Henshaw	6.68	a 20
Apr. 25	J. J. Dirzulaitis	8.00	273
May 27	do	6.90	0

a Estimated.

Daily discharge, in second-feet, of West Fork of Silvies River near Lawen, Oreg., for the year ending Sept. 30, 1919.

Day.	Apr.	May.	Day.	Apr.	May.	Day.	Apr.	May.
1		260	11	140	140	21	190	30
2		275	12	140	140	22	190	15
3		310	13	165	128	23	202	15
4		330	14	140	102	24	215	8
5	20	330	15	140	90	25	245	.....
6		310	16	165	90	26	215	.....
7		270	17	165	80	27	230	.....
8		252	18	190	80	28	230	.....
9		218	19	190	70	29	245	.....
10	50	170	20	190	50	30	245	.....
						31	.....	.....

NOTE.—Discharge, April 1–9 estimated. Practically no flow beginning May 25. Mean discharge for April, 135 second-feet; run-off, 8,030 acre-feet. Mean discharge for May, 121 second-feet; run off, 7440 acre-feet.

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DONNER UND BLITZEN RIVER NEAR DIAMOND, OREG.

LOCATION.—In SW. ¼ sec. 8, T. 32 S., R. 32½ E., at mouth of canyon, 1½ miles above P ranch buildings, 25 miles southwest of Diamond, and 40 miles above Narrows, Harney County.

DRAINAGE AREA.—200 square miles (measured on special map prepared by Garfield Stubblefield).

RECORDS AVAILABLE.—May 22, 1910, to September 30, 1916; April 15, 1917, to September 30, 1920; also January 26, 1909, to July 31, 1910, and November 1 to 12, 1910, at former station below several diversion ditches.

GAGE.—Vertical staff on left bank; gage datum not always properly maintained. Gage reader, Prim Ortego. Original gage was vertical staff on right bank just below the wagon bridge near the ranch buildings.

DISCHARGE MEASUREMENTS.—Made from a cable 75 yards above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and sand; one channel at all stages. Banks of the stream covered with a dense growth of willows and underbrush; subject to overflow at flood stages. Control composed of gravel; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, observed from high-water marks, 5.6 feet during night of March 29–30 (discharge, 1,670 second-feet); minimum stage recorded, 1.12 feet August 13–19 and 23 (discharge, 27 second-feet).

Maximum stage during year ending September 30, 1920, observed from high-water marks, 4.5 feet March 29–30 (discharge, 1,140 second-feet); minimum stage recorded, 1.14 feet December 15 (discharge, 29 second-feet).

1909–1920: Maximum stage recorded, 6.4 feet at 7.30 p. m. May 3, 1915 (discharge, 2,060 second-feet); minimum discharge 23 second-feet December 19 and 26, 1915, and January 2, 9, and 16, 1916.

ICE.—Stage-discharge relation not seriously affected by ice.

DIVERSIONS.—Present gage is above all irrigation ditches. Five ditches divert water from the stream above the old gage at ranch buildings.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during winter of 1918–19, May 24, 1919, and March 30, 1920. Well-defined rating curve used for October and November, 1918; two well-defined curves identical above 200 second-feet used March 22 to May 23, 1919, and May 24, 1919, to March 30, 1920; well-defined curve used March 31 to September 30, 1920. Gage read to hundredths once a day and high-water mark noted for days when there was considerable fluctuation. Daily discharge ascertained by applying to rating table the daily gage reading, or during high stages the mean gage height found by adding the high-water gage height to twice the daily reading and dividing by 3. Records good except for winter months and periods for which gage was not read.

Discharge measurements of Donner und Blitzen River near Diamond, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
1919.				1920.			
Mar. 22	Dirzulaitis and Hen-			Apr. 18	J. J. Dirzulaitis	2.25	239
	.....	1.48	58	19	....do	2.35	255
A-	s.....	2.32	213	June 7	E. R. Carter [a]	2.67	332
	.....	2.21	205	7	....do	2.62	331
	.....	2.96	462	26	A. H. Page [a]	1.88	141
	.....	2.98	418				
	.....	3.28	511				
	.....	3.14	475				
	.....	1.14	28.3				
	....	1.18	35.4				

n Livestock Co.

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Daily discharge, in second-feet, of Donner und Blitzen River near Diamond, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	54	36					445	525	220	69	31	27
2	57	36					485	445	220	69	31	27
3	46	36					525	340	173	67	29	27
4	63	36					565	358	173	67	29	27
5	46	36					290	340	260	64	31	27
6	54	36					260	322	260	64	29	27
7	43	36					195	340	153	57	29	33
8	41	36					195	358	148	52	27	27
9	31	36					170	322	140	52	28	27
10	31	33					260	275	117	49	27	27
11	28	33				50	220	305	107	49	28	27
12	28	33					245	290	107	47	28	27
13	31	36					148	305	101	47	27	27
14	31	36					124	322	101	45	27	27
15	36	36			50		132	340	101	45	27	29
16	41	36	40	40			170	322	101	42	27	30
17	43	36					208	305	98	40	27	31
18	63	38					232	322	101	37	27	29
19	46	41					208	485	98	37	27	29
20	36	41					232	525	95	37	28	29
21	36	38					305	525	92	35	27	29
22	33	36				57	358	605	89	35	28	29
23	33	36				75	410	565	89	35	27	29
24	33					85	525	445	86	35	27	29
25	33					95	445	445	83	35	27	29
26	33	35				132	410	485	83	35	27	29
27	33					220	392	445	80	34	27	29
28	33					525	485	340	72	33	27	29
29	36				.....	695	485	358	75	33	27	29
30	36				.....	785	485	220	72	33	27	29
31	36	.....			.....	605	.....	195	.....	31	27	.....
1919-20.												
1	31	37	40	38	103	63		305	290	127	60	37
2	33	37	40	33	78	101		282	355	120	58	37
3	33	37	37	33	59	69		260	372	113	58	37
4	33	37	35	33	54	54		338	425	665	56	37
5	33	37	35	33	45	49		425	425	165	53	37
6	33	37	35	33	42	52		460	390	107	53	37
7	33	37	33	33	40	136		500	355	100	48	37
8	33	33	33	33	40	220	150	460	355	97	46	39
9	33	33	33	33	40	163		560	355	91	43	39
10	33	33	31	33	35	69		500	355	88	46	39
11	33	33	31	33	33	64		442	338	86	43	39
12	33	33	31	33	33	75		425	320	85	41	
13	33	33	31	37	31	107		408	320	85	41	
14	33	33	30	37	31	87		442	320	82	41	
15	31	33	29	37	34	67		500	305	85	41	
16	31	35	31	40	37	62	138	540	290	82	41	
17	31	35	40	40	45	75	180	620	260	79	39	
18	31	35	67	41	98	104	222	688	248	79	37	
19	32	35	101	42	67	163	248	710	235	79	39	
20	33	33	83	45	57	92	149	688	210	79	39	
21	33	33	62	45	49	80	145	665	210	76	39	40
22	33	33	59	67	44	69	138	620	210	76	39	
23	33	33	57	78	40	67	149	580	198	76	39	
24	33	33	62	117	37	75	145	540	185	74	39	
25	33	31	54	104	31	69	155	460	165	72	39	
26	35	31	52	117	31	62	165	442	153	69	37	
27	37	33	47	153	31	57	235	408	144	66	37	
28	40	33	45	158	31	60	248	372	134	66	37	
29	40	37	47	153	47	64	390	355	127	63	38	
30	37	38	45	135	.....	408	372	338	131	63	39	
31	37	.....	42	128	.....	129	.....	320	.....	61	37	.....

NOTE.—No gage-height record Nov. 24, 1918, to Mar. 21, 1919, and Apr. 1-15, Sept. 12-30, 1920, discharge estimated. Braced figures show mean discharge for periods indicated.

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Monthly discharge of Donner und Blitzen River near Diamond, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	63	33	39.5	2,430
November	41	.....	35.9	2,140
December	.....	.....	40	2,460
January	.....	.....	40	2,460
February	.....	.....	50	2,780
March	785	.....	139	8,550
April	565	124	320	19,000
May	605	195	380	23,400
June	260	72	123	7,320
July	69	31	45.5	2,800
August	31	27	27.8	1,710
September	33	27	28.4	1,690
The year	785	27	106	76,700
1919-20.				
October	40	31	33.5	2,060
November	38	31	34.3	2,040
December	101	29	45.1	2,770
January	153	33	63.5	3,900
February	103	31	46.3	2,660
March	408	49	96.9	5,960
April	390	.....	178	10,600
May	710	260	473	29,100
June	425	127	273	16,200
July	665	61	105	6,460
August	60	37	43.3	2,660
September	.....	.....	40.5	2,410
The year	710	29	120	86,800

DONNER UND BLITZEN RIVER NEAR NARROWS, OREG.

LOCATION.—In NE. ¼ sec. 26, T. 29 S., R. 31 E., at "grain camp" at bridge over movable diversion dam immediately below intake of Buena Vista canal, 2 or 3 miles above mouth of Keiger Creek, and 25 miles south of Narrows, Harney County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 21 to July 31, 1915; April 7 to July 17, 1916; April 16, 1917, to June 6, 1919; and September 1, 1919, to September 2, 1920.

GAGE.—Vertical staff on west abutment of bridge; read by Mrs. S. A. Jones.

DISCHARGE MEASUREMENTS.—Made from cable about 200 feet below gage or by wading.

CHANNEL AND CONTROL.—Artificial channel excavated in clayey material; banks fairly even and not subject to overflow. Control not well defined.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 5.1 feet March 30 (discharge, 432 second-feet); minimum discharge, 14 second-feet, October 1.

Maximum stage recorded during year ending September 30, 1920, 4.7 feet March 2, May 10, 11, and 22–24 (discharge, 364 second-feet); minimum stage 1.20 feet July 11 and August 6 (discharge, 16 second-feet).

1915-1920: Maximum stage about 7.5 feet during March, 1917, as indicated by high-water marks (discharge, 780 second-feet); minimum stage recorded 0.36 foot May 25 and 26, 1918 (discharge, 0.3 second-foot).

ICE.—No ice reported in 1919, probably some ice effect during January. Stage-discharge relation not seriously affected by ice in 1920.

DIVERSIONS.—About 14,000 acres of the P ranch lands are irrigated by spring flooding from the river and its tributaries above the station. The Buena Vista canal and three small ditches—the Schaper, Larson, and Westside—divert water from

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river just above gage. (See p. 314 for records on Buena Vista canal.) Miscellaneous measurements of these ditches are given on page 341. Their total diversion estimated from the best available data is included in the table of monthly discharge.

REGULATION.—The diversion dam above the gage backs up the water 4 or 5 miles; the pondage thus created may affect materially the discharge of a day or two.

ACCURACY.—Stage-discharge relation changed during winter of 1919, date of change assumed as January 1, 1919; practically permanent during 1920. Two well-defined rating curves used. Gage read once a day to hundredths except from October 24, 1918, to March 20, 1919, and from October 1, 1919, to April 30, 1920, when it was read about three times a week. Daily discharge ascertained by applying daily gage readings to rating table. Records good except November, 1918, to February, 1919, which are poor.

Discharge measurements of Donner und Blitzen River near Narrows, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Mar. 22	Dirzulaitis and Henshaw	1.96	49.2	Apr. 18	J. J. Dirzulaitis	3.51	191
31	J. J. Dirzulaitis	4.30	310	19	do	[a] 4.00	280
Apr. 10	do	2.10	56	June 10	A. H. Page [b]	2.60	79
28	do	4.12	279	July 12	E. R. Carter [b]	1.36	20.5
May 23	do	4.10	260				
Sept. 6	do	1.26	17.2				

[a] Changing stage; gates had just been opened. [b] Engineer for the Eastern Oregon Livestock Co.

Daily discharge, in second-feet, of Donner und Blitzen River near Narrows, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July	Aug.	Sept.
1918-19.												
1	14					48	285	285	213			40
2	16	34				50	270	285	118			
3	18				31	50	270	285	114			40
4	21	34				50	270	285	66			
5	26					50	285	270	69			
6	27				20	51	270	251	69			18
7	28	34	30			52	186	232				23
8	30					53	150	213				
9	30	92	32			50	76	186				23
10	30				21	50	53	199				
11	30		32			50	59	199				22
12	30	39				50	56	199				
13	30				23	50	56	186				22
14	30		34			49	53	186				
15	30	36			29	48	50	186				22
16	30		36	30		47	45	186				
17	30	34			31	46	45	186				
18	30		34			45	114	186				22
19	30					45	109	186				
20	30	34			35	45	114	186				19
21	30		34			48	114	186				
22	32				38	48	109	270				19
23	34	34	34			45	109	270				
24	34				45	48	174	270				18
25	33					50	285	270				
26	32		32			50	285	270				
27	31				45	53	300	255				19
28	30					56	270	241				
29	31	30	29			100	278	241				19
30	33					432	285	227				
31	34		28			316		227				

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Daily discharge, in second-feet, of Donner und Blitzen River near Narrows, Oreg., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	19	.....	45	.....	.....	.....	.....	174	199	83	56	53
2	.....	35	.....	91	150	364	199	241	186	19	56	53
3	.....	.....	.....	.....	.....	.....	.....	241	186	19	56	.....
4	19	.....	42	.....	.....	100	199	255	186	27	38	.....
5	.....	118	.....	118	118	.....	.....	255	174	25	21	.....
6	19	.....	42	.....	.....	104	270	285	186	23	16	.....
7	.....	.....	.....	128	76	.....	.....	285	186	35	35	.....
8	.....	35	31	.....	.....	118	174	348	174	40	35	.....
9	.....	.....	.....	.....	69	.....	.....	348	174	50	38	.....
10	26	100	38	139	.....	139	150	364	91	66	35	.....
11	.....	.....	.....	.....	69	.....	.....	364	96	16	35	.....
12	31	35	.....	139	.....	128	139	45	91	23	35	.....
13	.....	.....	45	.....	72	.....	.....	285	91	24	35	.....
14	.....	.....	.....	139	.....	109	91	45	91	25	35	.....
15	45	23	.....	.....	69	.....	.....	227	27	50	35	.....
16	.....	48	45	118	.....	109	199	213	23	35	35	.....
17	45	.....	.....	.....	62	.....	.....	213	128	83	35	.....
18	.....	50	.....	91	.....	109	.....	227	128	69	38	.....
19	45	.....	227	.....	50	.....	270	255	118	66	38	.....
20	.....	53	.....	72	.....	104	.....	316	114	62	38	.....
21	33	.....	300	.....	48	.....	199	332	69	62	38	.....
22	.....	69	.....	66	.....	109	.....	364	69	62	40	.....
23	.....	.....	.....	.....	45	.....	174	364	69	62	56	.....
24	.....	.....	241	83	.....	109	.....	364	66	59	69	.....
25	48	118	.....	174	45	.....	118	364	62	59	83	.....
26	.....	.....	.....	.....	.....	109	.....	348	62	59	109	.....
27	42	48	139	174	48	.....	162	332	56	56	118	.....
28	40	.....	.....	.....	.....	186	.....	316	59	56	83	.....
29	.....	45	.....	186	40	199	174	300	66	56	72	.....
30	.....	.....	109	.....	.....	.....	.....	227	69	56	56	.....
31	38	.....	.....	174	.....	174	.....	128	.....	56	53	.....

NOTE.—Stage-discharge relation affected by ice during January, 1919; discharge estimated.

Monthly discharge of Donner und Blitzen River near Narrows, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	34	14	28.8	1,770
November	92	30	40.1	2,380
December	36	28	32.3	1,990
January	.....	.....	30.0	1,840
February	45	20	31.8	1,770
March	432	45	71.8	4,410
April	300	45	168	10,000
May	285	186	229	14,100
June 1–6	213	66	108	1,290
The period	.....	.....	.....	39,600
1919–20.				
October	48	19	34.6	2,120
November	118	23	59.7	3,550
December	300	31	109	6,700
January	186	66	126	7,750
February	150	40	68.6	3,950
March	364	100	142	8,730
April	270	91	180	10,700
May	364	45	272	16,700
June	199	23	110	6,550
July	83	16	47.8	2,940
August	118	16	49.1	3,020
The period	364	16	113	72,700

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Monthly discharge of Donner und Blitzen River and canals near Narrows, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Mean discharge in second-feet.				Run-off in acre-feet.
	River.	Buena Vista canal.	Other canals.	Total.	
1918-19.					
October	28.8	0	0	28.8	1,770
November	40.1	0	0	40.1	2,390
December	32.3	[a]15.0	0	47.3	2,910
January	[a]30.0	[a]15.0	0	45.0	2,770
February	31.8	[a]18.0	0	49.8	2,770
March	71.8	34.0	[a]10	116	7,130
April	168	76.8	[a]5	250	14,900
May	229	75.5	[a]20	324	19,900
June 1-6	108	57.5	[a]40	206	2,450
The period					57,000
1919-20.					
October	34.6	0	0	34.6	2,130
November	59.7	0	0	59.7	3,550
December	109	0	0	109	6,700
January	126	0	0	126	7,750
February	68.6	0	0	68.6	3,950
March	142	0	0	142	8,730
April	180	2.18	5.2	187	11,100
May	272	64.3	9.6	346	21,300
June	110	87.1	14.9	212	12,600
July	47.8	17.6	5.8	71.2	4,380
August	49.1	1.85	0	51.0	3,140
The period					85,300

[a] Estimated.

DONNER UND BLITZEN RIVER NEAR VOLTAGE, OREG.

LOCATION.—In sec. 35, T. 26 S., R. 31 E., at bridge on road known as Sod-house Lane, along original meander line of Malheur Lake, 2 miles west of Voltage post office and 6 miles east of Narrows, Harney County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 6, 1916, to September 30, 1917; April 17 to May 25, 1918; and March 20 to June 6, 1919.

GAGE.—Vertical staff on abutment of bridge; also a gage on one of the main overflow channels 1 mile west of the main channel; read by A. A. Pruitt.

DISCHARGE MEASUREMENTS.—Made from bridges across main channel and 16 culverts which carry water at high stages; measuring conditions poor.

CHANNEL AND CONTROL.—Channel crooked and turns abruptly to right just below bridge; no well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of 1919, 2.8 feet April 1 (discharge, 310 second-feet); minimum stage not determined.

1916-1919: Maximum stage recorded 3.3 feet May 21, 1917 (discharge, 800 second-feet); discharge practically zero during summer of 1918.

ICE.—No record during ice period of 1919.

DIVERSIONS.—Several thousand acres irrigated from the river and its tributaries; discharge at station is largely return water.

REGULATION.—Discharge considerably influenced by diversion dams.

ACCURACY.—Stage-discharge relation not permanent. Three fairly well defined rating curves used for main channel; one poorly defined curve for overflow. Gages read to hundredths about three times a week. Daily discharge ascertained by applying daily gage reading to rating table. Records fair.

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Discharge measurements of Donner und Blitzen River near Voltage, Oreg., during the year ending Sept. 30, 1919.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 20	F. F. Henshaw	0.48	52	Apr. 20	J. J. Dirzulaitis	0.39	35.1
27	J. J. Dirzulaitis	.64	58	May 22	do	2.21	[a] 99
Apr. 3	do	2.76	298	22	do	[b] .82	[c] 129
12	do	.54	45.6				

[a] Main channel only. [b] Gage in overflow channel. [c] Overflow.

Daily discharge, in second-feet, of Donner und Blitzen River near Voltage, Oreg., for the year ending Sept. 30, 1919.

Day.	Mar.	Apr.	May.	June.	Day.	Mar.	Apr.	May.	June.
1		310			16		44	154	
2		295	147	245	17		[a] 40		
3		300			18		36		
4		290		218	19		[a] 36	139	
5		[a] 280	164		20	51	36		
6		[a] 270	169	201	21		34	167	
7		262	151		22	52	[a] 32		
8		[a] 184			23		30		
9		106	145		24	53	[a] 42	167	
10		[a] 85			25	[a] 56	55		
11		[a] 64			26	58	[a] 88	230	
12		44	154		27	59	[a] 122		
13		[a] 62			28	62	154	230	
14		80	172		29		[a] 150		
15		[a] 62			30	180	147	229	
					31				

[a] Interpolated.

Monthly discharge of Donner und Blitzen River near Voltage, Oreg., for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
March 20–31		51	86.2	2,050
April	310	30	125	7,440
May	230	139	173	10,600
June 1–6	245	201	221	2,630
The period				22,700

BUENA VISTA CANAL NEAR NARROWS, OREG.

LOCATION.—In NE. ¼ sec. 26, T. 29 S., R. 31 E., at bridge over canal, 300 feet below intake, opposite station on Donner und Blitzen River at "grain camp," 25 miles south of Narrows, Harney County.

RECORDS AVAILABLE.—Irrigating seasons 1915 to 1920.

GAGE.—Vertical staff on pier of bridge; read by Mrs. S. A. Jones. Datum of gage 0.95 foot above that used in 1915 to 1917.

DISCHARGE MEASUREMENTS.—Made from wagon bridge.

CHANNEL AND CONTROL.—Canal is about 4 feet deep, excavated in a clayey material.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of 1919, 2.98 feet March 29 (discharge, 127 second-feet); canal dry at times. Maximum stage recorded during period of 1920, 4.0 feet May 12, 19–21 (discharge, 150 second-feet).

1915–1920: Maximum stage recorded, 4.6 feet May 14, 1915 (discharge, 179 second-feet); canal dry at times each year.

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ICE.—Water turned out of canal during extremely cold weather.

ACCURACY.—Stage-discharge relation changed several times during 1919; permanent during 1920. Rating curves used as follows: March 21-29 and April 6-22, 1919, fairly well defined; March 30 to April 5, 1919, poorly defined; April 23 to June 6, 1919, well defined; 1920 rating fairly well defined. Gage read to hundredths once a day. Daily discharge ascertained by applying daily gage reading to rating table. Records fair.

Buena Vista canal diverts water from left bank of Donner und Blitzen River in NE. ¼ sec. 26, T. 29, S., R. 31, E. to irrigate marsh hay lands on west side of river.

Discharge measurements of Buena Vista canal near Narrows, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Mar. 21	F. F. Henshaw	0.42	29.3	June 9	A. H. Page [a]	2.42	83
31	J. J. Dirsulaitis	2.33	99	10	do	3.26	118
Apr. 10	do	1.78	73	July 12	Carter	.14	2.7
28	do	1.22	61				
May 23	do	2.24	100				
Sept. 6	do	−.54	6.9				

[a] Engineer for Wm. Hanley Co.

Daily discharge, in second-feet, of Buena Vista canal near Narrows, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	1919					1920				
	Feb.	Mar.	Apr.	May.	June.	Apr.	May.	June.	July.	Aug.
1			82	67	45		0	73	76	0
2			47	67	53		0	70	38	0
3	56		39	71	49		0	78	35	0
4			27	60	64		0	80	35	0
5			114	57	67		0	94	35	0
6	17		114	60	67		0	98	39	0
7			69	62			0	90	42	0
8			63	64			0	86	35	3.1
9			110	67			0	83	82	3.1
10		15	78	67			0	119	58	4.2
11			75	67			0	132	60	4.2
12			75	75			150	119	2.7	4.8
13			75	67			32	117	2.7	4.2
14			71	64			128	116	2.7	4.2
15			71	64			93	132	2.7	3.1
16			71	64			94	119	0	3.1
17			71	64			107	105	0	2.7
18			82	67			132	73	0	2.7
19			69	71			150	72	0	2.0
20		20	78	71			150	70	0	2.0
21		29	82	83			180	78	0	2.0
22		38	98	99			117	78	0	2.0
23		53	107	105		7.0	107	78	0	2.0
24		66	99	111			99	76	0	2.0
25		78	95	107		13	94	62	0	2.0
26		78	83	107			93	60	0	2.0
27		82	72	64		4.2	60	57	0	2.0
28		98	60	79			43	62	0	0
29		127	62	111		8.5	39	64	0	0
30		10	64	95			70	73	0	0
31		90		64			78		0	0

NOTE.—Discharge Mar. 1-20, 1919, estimated.

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Monthly discharge of Buena Vista canal near Narrows, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
December			a 15.0	922
January			a 15.0	922
February	56		a 18.0	1,000
March	127	a 10	34.0	2,090
April	114	27	76.8	4,570
May	111	57	75.5	4,640
June 1–6	67	45	57.5	684
The period				14,800
1920.				
April 23–30	13	4.2	8.13	120
May 12–31	150	32	99.6	5,950
June	122	57	87.1	5,180
July 1–15	82	2.7	36.4	1,080
August 8–27	4.8	2	2.87	114
The period				10,500

a Estimated.

KEIGER CREEK NEAR DIAMOND, OREG.

LOCATION.—In NW. ¼ sec. 10, T. 30 S., R. 33 E., 100 yards above point where creek forks, 2½ miles southeast of Diamond, Harney County.

DRAINAGE AREA.—75 square miles.

RECORDS AVAILABLE.—1909–1913; 1915–1920; fragmentary.

GAGE.—Stevens 8-day recorder installed on left bank May 27, 1917, 25 feet below old vertical staff used up to that time; gage used 1909 and 1910 at different location and datum. Gage reader, H. A. Brenner.

DISCHARGE MEASUREMENTS.—Made from footbridge or by wading.

CHANNEL AND CONTROL.—Gravel; somewhat shifting. Banks brush covered; not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 3.00 feet at 8 a. m. April 25 (discharge, 181 second-feet); minimum stage from water-stage recorder, 0.61 foot August 28 (discharge, 4.3 second-feet).

Maximum stage during period of 1920 from water-stage recorder, 3.07 feet at 7 a. m. May 21 (discharge, 201 second-feet); minimum stage from water-stage recorder, 0.60 foot from 10 a. m. August 16 to noon August 18 (discharge, 8 second-feet).

1909–1920: Maximum stage recorded, 4.7 feet May 9, 1912 (discharge, 330 second-feet). A higher flood may have occurred while records were suspended. Minimum stage 0.56 foot, February 16, 1918 (discharge 3.2 second-feet).

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—None above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent during 1919 except as affected by ice; changed during period of no record in first half of 1920 year and remained permanent; rating curves well defined. Operation of water-stage recorder fairly satisfactory October 1 to December 16, 1918, and March 21 to September 14, 1919, and May 3 to September 26, 1920, except for short periods indicated in footnote to daily discharge table. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspection of

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recorder graph or at times of considerable fluctuation by averaging discharge for intervals of the day. Records good except December, 1918, January and February, 1919, and April, 1920, which are poor, and the short periods when water-stage recorder did not operate satisfactorily, which are fair.

Discharge measurements of Keiger Creek near Diamond, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Mar. 21	F. F. Henshaw	0.80	11.0	Apr. 17	J. J. Dirzulaitis	1.34	54
Apr. 1	J. J. Dirzulaitis	1.38	50	17	do	1.34	54
11	do	1.48	58	23	Page and Carter	1.23	44.9
29	do	2.69	146	May 13	do	2.59	137
May 24	do	2.37	128	June 12	A. H. Page	1.63	79
Sept. 7	do	.79	9.4	July 7	Carter	1.20	41.6

Daily discharge, in second-feet, of Keiger Creek near Diamond, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.									
1	7.0	6.4		50	172	69	26	8.2	6.4
2	6.7	6.1		50	163	65	25	7.4	6.1
3	7.4	5.8		57	145	65	24	7.8	6.1
4	7.4	6.4		a 100	137	61	23	8.2	5.8
5	6.4	6.7		a 75	137	61	21	8.2	6.1
6	7.0	7.0		54	129	57	21	7.8	8.6
7	8.2	6.1		50		57	21	6.7	10
8		6.4		46	120	54	21	5.5	10
9		9.0		46		50	20	7.0	9.8
10	7.0	8.2	7.0	50		50	20	6.1	9.4
11		8.6		61	113	46	20	6.4	7.4
12	5.8	7.8		54	113	43	17	6.7	6.7
13	5.5	7.8		50	105	42	15	6.7	7.0
14	5.2	8.2		46	113	42	14	6.7	7.0
15	5.2	8.6		46	113	42	12	6.7	
16	7.8	8.2		46	121	41	12	6.1	
17	8.2	7.0		54	105		12	5.8	
18	6.7	9.0		77	105		11		
19	6.4	8.2		81	121	37	11		
20	6.4	7.0		85	137		12		
21	6.4	7.0	12	93	145		11	5.5	
22	6.4	7.4	12	105	145	35	10		7.0
23	6.4	14.0	20	129	154	34	10		
24	6.1	8.6	14	154	137	32	9.8	5.2	
25	6.1	8.6	14	172	113	31	9.0	5.2	
26	6.1		16	145	105	30	9.0	4.9	
27	6.1		24	145	113	30	9.4	4.6	
28	6.4	9.0	40	145	113	30	9.0	4.3	
29	6.4		62	145	113	30	8.6	4.8	
30	6.4		68	163	77	28	8.6	5.2	
31	6.4	.....	57	.....	65	.....	8.2	6.4	.....

a Estimated.

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Daily discharge, in second-feet, of Keiger Creek near Diamond, Oreg., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1920.						1920.					
1	90	93	45	12	13	16	146	65	28	9	12
2	90	93	42	12	12	17	155	65	28	8	10
3	94	94	42	11	11	18	155	65	24	9	10
4	112	99	86	11	11	19	160	65	20	9	10
5	132	102	58	11	11	20	168	65	20	9	10
6	142	98	49	11	11	21	173	58	20	9	10
7	142	92	43	10	10	22	155	58	20	9	10
8	151	92	39	10	10	23	155	56	20	9	11
9	160	90	36	10	10	24	128	52	20	9	16
10	168	85	34	10	11	25	112	50	20	19	16
11	137	79	32	10	12	26	93	54	20	21	15
12	137	76	28	10	11	27	85	52	16	16	15
13	142	78	28	9	14	28	94	46	15	18	15
14	137	65	28	9	14	29	96	47	14	16	15
15	142	65	28	9	14	30	97	52	13	14	15
						31	99	.....	12	14	.....

NOTE.—Discharge for following periods estimated because water-stage recorder did not operate satisfactorily: Oct. 8-11, 1918, May 7-10, June 17 21, Aug. 18-23, 1919, May 8, June 14-20, July 12-17, 19-26, and Sept. 27-30, 1920; also Sept. 15-30, 1919, Apr. 1-16, 18-22, 24-30, May 1 and 2, 1920, owing to lack of gage readings. Discharge, Nov. 26, 1918, to Feb. 28, 1919, estimated because of ice, by comparison with records of flow of McCoy Creek; Mar. 1-20, 1919, estimated on basis of weekly gage readings and records of flow for other streams.

Monthly discharge of Keiger Creek near Diamond, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	8.2	5.2	6.60	406
November	14	5.8	7.97	474
December	.....	.....	*9.0	553
January	.....	.....	*7.0	430
February	.....	.....	*9.0	509
March	.....	.....	15.5	953
April	172	46	85.8	5,110
May	172	65	122	7,500
June	69	28	42.7	2,600
July	26	8.2	14.9	916
August	8.2	4.3	6.17	379
September	.....	.....	7.28	433
The year	172	.....	28.0	20,300
1920.				
May	173	85	131	8,060
June	102	46	71.7	4,270
July	86	12	29.9	1,840
August	21	8	11.4	701
September	16	10	12.2	726
The period	.....	.....	.....	15,600

* Estimated.

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M'COY CREEK NEAR DIAMOND, OREG.

LOCATION.—In sec. 12, T. 30 S., R. 32 E., 1,000 feet above Wells' ranch house and 5 miles southwest of Diamond, Harney County.

DRAINAGE AREA.—45 square miles (measured on special maps prepared by Garfield Stubblefield).

RECORDS AVAILABLE.—May 23, 1910, to September 30, 1920; fragmentary; also January 27 to June 30, 1909, on original gage which was below some diversions.

GAGE.—Vertical staff on right bank, installed August 7, 1913, 250 feet below that installed May 23, 1910. Gage reader, C. A. Wells. The original gage was 2½ miles farther downstream and 3 miles from Diamond post office. Temporary gage at Frazier ranch, about 2 miles below regular gage read May 1 to September 30, 1919; gage reader, Lucille Frazier.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge at Frazier gage.

CHANNEL AND CONTROL.—Clean gravel and sand at both gages; likely to shift slightly in floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 2.8 feet on temporary gage at Frazier ranch May 22 and 23 (discharge, 205 second-feet); minimum stage 1.48 feet December 10 and 11 (discharge, 1.4 second-feet).

Maximum stage recorded during period of 1920, 4.2 feet July 4 (discharge, 175 second-feet); minimum stage 1.64 feet August 15–17 (discharge, 2.8 second-feet).

1910–1920: Maximum stage recorded, 6.6 feet during night of June 7, 1912 (discharge, from extension of rating curve, 300 second-feet); minimum discharge 0.7 second-foot March 14, 1918.

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Station at Wells ranch above all diversions except one unimportant ditch; one small ditch diverts around Frazier gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed some time between measurements of August, 1918, and March, 1919; permanent during 1920. Rating curves used as follows: October 1–20, 1918, fairly well defined; February 15 to May 10, well defined above 4 second-feet; May 11, to September 30, 1919, poorly defined; April 9 to September 30, 1920, fairly well defined. Indirect method for shifting control used October 21, 1918, to January 31, 1919. Gage read twice a day to hundredths prior to May 10, 1919, once a day thereafter. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair for 1919 and good for 1920, except those for periods when gage was not read which are poor.

Discharge measurements of McCoy Creek near Diamond, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge
1919.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Mar. 21	F. F. Henshaw	1.53	4.4	Sept. 7	J. J. Dirsulaitis	a 0.51	3.2
Apr. 1	J. J. Dirsulaitis	1.96	17.8				
11	do	2.02	20.8	1920.			
30	do	3.15	93	Apr. 17	do	2.12	19.8
May 24	do	3.50	112	17	do	2.12	19.8
24	do	a 1.99	104	June 6	Page and Carter	3.15	82

a Reading on gage of Frazier ranch.

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Daily discharge, in second-feet, of McCoy Creek near Diamond, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	1.4	2.0	3.2			3.3	18	106	55	14		
2	1.4	2.0	3.0			5.2	18	103	47	12		
3	1.5	2.0	2.5			5.2	23	98	60	12		3.0
4	1.5	2.0	2.5			3.5	49	92	73	12		
5	1.5	2.0	2.2			3.5	25	100	55	14		
6	1.8	2.2	2.2			3.5	20	92	47	14		
7	1.8	1.5	2.8			5.0	18	102	40	15		3.2
8	1.5	2.0	3.5		3.0	3.5	18	106	40	7.7		3.1
9	1.4	1.5	2.0			5.0	16	97	33	7.7		3.0
10	1.4	1.4	1.5			5.0	28	86	33	7.4		3.0
11	1.5	1.6	1.8			4.0	22	100	27	4.8		3.0
12	1.5	1.8	3.0	2.0		2.7	20	94*	24	4.8		3.0
13	1.5	1.8	4.3			3.8	20	83	30			3.0
14	1.4	1.5	3.0			3.5	17	116	22			3.0
15	1.5	2.0	2.8		3.5	3.5	18	110	27		3.0	3.0
16	2.8	1.4	2.2		5.2	3.3	17	116	22			2.8
17	1.5	1.4	2.0		5.0	4.8	19	94	22			3.0
18	1.5	2.2			4.8	5.5	22	110	24			7.7
19	1.4	1.8			4.5	4.5	26	152	22			7.7
20	1.4	1.4			4.2	3.5	29	177	22			7.4
21	1.5	1.5			3.5	4.0	32	164	26	4.0		3.0
22	1.5	1.5			3.3	4.0	38	205	16			3.0
23	1.5	1.5			4.0	6.3	49	205	16			3.0
24	1.4	1.5	2.0	2.8	4.0	5.5	64	124	16			3.0
25	1.5	2.0		2.8	4.0	5.2	74	140	16			3.0
26	1.5	1.8		2.6	3.3	6.6	64	122	15			3.0
27	2.0	2.0		2.5	4.5	10	82	152	15			3.0
28	2.0	2.0		3.5	5.0	30	85	152	16			
29	1.8	2.0		3.0	.....	22	88	128	12			3.0
30	1.5	2.2		3.0	.....	22	99	83	12			
31	1.5	.....	.....	3.0	.....	18	.....	64	.....			.....

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1920.													
1		35	84	35	5.8	5.2	16	24	80	73	16	2.8	8.2
2		32	91	33	5.2	4.6	17	18	80	70	14	2.8	
3		36	87	35	5.2	4.0	18	22	95	62	14	3.2	7.0
4		40	103	175	5.2	4.0	19	22	111	59	12	3.6	
5	16	43	119	46	4.6	4.0	20	23	127	59	11	3.6	
6		52	95	39	4.6	4.0	21	22	155	59	11	3.2	7.6
7		70	87	34	4.0	4.6	22	23	136	52	11	3.2	8.8
8		80	111	28	4.0	4.6	23	17	119	49	11	3.2	9.4
9	20	87	95	28	4.0	5.8	24	16	84	40	9.4	3.2	8.8
10	20	80	87	27	4.0	5.8	25	15	84	40	8.8	12	8.8
11	14	73	78	27	4.0	5.2	26	16	73	40	8.2	10	8.8
12	16	66	87	22	4.0	8.8	27	21	73	33	7.0	8.2	8.8
13	23	80	80	20	3.6	7.6	28	26	103	35	7.0	7.6	8.8
14	23	70	66	19	3.2	7.6	29	34	87	34	7.0	8.8	11
15	22	80	80	17	2.8	8.2	30	39	87	40	5.8	8.2	10
							31	.....	80	.....	5.8	6.4	.....

NOTE.—Discharge, Nov. 22, 23, 28, 29, Dec. 1–31, 1918, Jan. 1–23, and Jan. 30 to Feb. 14, 1919, estimated because of ice. Gage not read Nov. 11 and 27, 1918, Feb. 17, 19, July 13 to Sept. 6, Sept. 8 and 28–30, 1919, Apr. 1–8 and Sept. 17–20, 1920; discharge estimated. Braced figures show mean discharge for periods indicated.

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Monthly discharge of McCoy Creek near Diamond, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	2.8	1.4	1.58	97
November	2.2	1.4	1.78	106
December	4.3	.....	2.34	144
January	3.5	.....	2.23	137
February	5.2	.....	3.60	200
March	32	2.7	7.27	447
April	99	16	37.3	2,220
May	205	64	119	7,320
June	73	12	29.5	1,760
July	15	.....	6.50	400
August	.....	.....	3.00	184
September	7.7	.....	3.46	206
The year	205	1.4	18.2	13,200
1920.				
April	39	14	20.1	1,200
May	155	32	80.6	4,960
June	119	33	69.7	4,150
July	175	5.8	24.0	1,480
August	12	2.8	49.7	306
September	11	4.0	71.5	425
The period	.....	.....	.....	12,500

RIDDLE CREEK NEAR DIAMOND, OREG.

LOCATION.—In sec. 23, T. 28 S., R. 33 E., at bridge on road from Diamond to Waverly, at dam site of proposed Happy Valley reservoir, below all tributaries, 8 miles northeast of Diamond, Harney County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 27 to October 17, 1917, March 17 to September 16, 1918, March 1 to July 5, 1919; March 14 to July 3, 1920.

GAGE.—Vertical staff on abutment of highway bridge; read by Sylvester Smith.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Channel of mud and sand with overhanging willows; crooked, no defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of 1919, 2.44 feet at 8 a. m., March 31 (discharge, 106 second-feet); minimum stage 0.20 foot, June 19–22 (discharge, estimated 0.2 second-foot).

Maximum stage recorded during period of 1920, 2.30 feet at 6 p. m. April 15 (discharge, 93 second-feet); minimum not recorded.

1917–1920: Maximum stage 4.5 feet probably March 27, 1917 (discharge, 330 second-feet); minimum stage 0.20 foot June 19–22, 1919 (discharge, estimated 0.2 second-foot).

ICE.—No record during frozen period.

DIVERSIONS.—A considerable area of hay land is irrigated above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation probably permanent. No discharge measurements were made in 1920 but three measurements made in 1921 indicate no change in rating curve applicable in 1919. Rating curve well defined above 10 second-feet. Gage read twice a day to hundredths, March 1 to July 5, 1919, and March 14 to July 3, 1920. Daily discharge ascertained by applying daily mean gage height to rating table. Records good, except June and July, 1919, for which the rating is not well defined.

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Discharge measurements of Riddle Creek near Diamond, Oreg., during the year ending Sept. 30, 1919.

[Made by J. J. Dirzulaitis.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Mar. 26	1.17	17.2	Apr. 12	1.75	48.2
Apr. 3	2.14	80	21	1.65	46.0

Daily discharge, in second-feet, of Riddle Creek near Diamond, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	1919					1920				
	Mar.	Apr.	May.	June.	July.	Mar.	Apr.	May.	June.	July.
1	4.0	89	24	2.0	0.7	.....	20	36	8.8	12
2	4.6	62	24	2.0	.7	.....	22	36	9.1	10
3	12	66	20	1.9	.7	.....	20	34	8.8	11
4	5.4	85	19	2.0	.7	.....	22	31	9.4	.....
5	4.6	98	20	2.0	.8	.....	24	28	11	.....
6	4.8	59	16	1.3	.....	.....	40	26	12	.....
7	4.6	44	16	1.3	.....	.....	55	23	9.7	.....
8	4.8	39	16	1.3	.....	.....	69	24	8.2	.....
9	4.8	40	14	1.3	.....	.....	69	37	7.6	.....
10	4.8	39	10	1.3	.....	.....	59	55	7.9	.....
11	4.6	48	13	1.3	.....	.....	52	38	7.3	.....
12	2.3	48	12	1.8	.....	.....	52	30	6.8	.....
13	3.2	48	9.1	1.6	.....	.....	59	28	7.0	.....
14	2.3	36	7.6	1.3	.....	18	69	25	6.8	.....
15	2.6	34	6.4	1.2	.....	26	81	24	10	.....
16	1.7	30	5.4	.3	.....	22	81	24	11	.....
17	2.1	48	6.8	.3	.....	18	52	23	10	.....
18	6.2	52	6.0	.3	.....	16	59	22	11	.....
19	4.6	52	5.0	.2	.....	11	69	18	9.7	.....
20	3.4	41	4.8	.3	.....	14	73	17	7.9	.....
21	5.8	40	4.0	.2	.....	20	55	16	7.6	.....
22	6.2	39	2.9	.2	.....	24	44	14	7.0	.....
23	6.6	39	2.4	.4	.....	26	33	20	7.0	.....
24	10	39	2.0	.4	.....	20	34	22	6.6	.....
25	9.7	39	2.0	.4	.....	24	31	31	6.3	.....
26	13	40	2.4	.5	.....	18	31	22	10	.....
27	22	40	3.0	.7	.....	17	33	18	9.7	.....
28	33	32	3.2	.7	.....	18	36	14	9.1	.....
29	48	26	2.8	.7	.....	18	35	12	8.8	.....
30	81	19	2.6	.7	.....	22	35	13	13	.....
31	93	.....	2.0	.....	.....	28	.....	11	.....	.....

Monthly discharge of Riddle Creek near Diamond, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919.				
March	93	1.7	13.4	824
April	98	19	47.0	2,800
May	24	2.0	9.17	564
June	2.0	.2	1.0	60
July 1–5	.8	.7	.72	7
The period	.....	.....	.....	4,260
1920.				
March 14–31	28	11	20.0	714
April	73	20	47.1	2,800
May	55	11	24.9	1,530
June	13	6.6	8.85	527
The period	.....	.....	.....	5,570

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SILVER CREEK ABOVE SUNTEX, OREG.[1]

LOCATION.—In NW. ¼ sec. 30, T. 22 S., R. 26 E., at Cecil ranch, 3 miles below junction of Nichols Creek, 12 miles above former post office of Riley, and 5 miles above Suntex, Harney County.

DRAINAGE AREA.—260 square miles (measured on maps of United States Reclamation Service).

RECORDS AVAILABLE.—April 19, 1904, to July 14, 1906; February 16 to December 12, 1909; April 6 to October 19, 1910; flood periods of 1911, 1912, and 1914–1920.

GAGE.—Vertical and inclined staff on right bank, one-fourth mile above Cecil ranch house and 100 yards above point where creek divides into three channels; read by J. C. Cecil. Datum of gage in 1919 somewhat different from that used for other years. Different gages used 1904–1906 and 1909–1910.

DISCHARGE MEASUREMENTS.—Made from cable 100 yards below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of clean gravel; slightly shifting; banks heavily covered with willows, which may affect stage-discharge relation somewhat.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period in 1919, 7.0 feet at 5 p. m. April 4 (discharge, 645 second-feet). No record of minimum.

Maximum stage recorded during period in 1920, 6.3 feet at 3 a. m. January 27 (discharge, 520 second-feet); no record of minimum discharge.

1904–1906 and 1909–1920: Maximum stage recorded, 13.95 feet on original gage, observed from high-water mark April 14, 1904 (discharge, 1,760 second-feet); stream bed dry in August and September, 1910.

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Practically no land irrigated above.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curves well defined. Gage read to half-tenths twice daily, and maximum heights noted when there was considerable fluctuation except from February 1 to April 2, 1920, when gage was read twice a week. Daily discharge ascertained by applying to rating table the mean daily gage height except during period gage was read twice a week when daily discharge was determined by applying gage reading to rating table and interpolating for intervening days. Records good except for March, 1919, and February and March, 1920, which are only fair on account of the ice obstruction, large diurnal fluctuation, and infrequency of gage readings.

Discharge measurements of Silver Creek above Suntex, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Mar. 24	Dirzulaitis and Henshaw	[a] 4.48	165	Apr. 19	R. D. Cooper	5.43	430
				23	do	4.38	301
24	Henshaw and Dirzulaitis	[a] 3.26	172	25	do	4.10	273
				May 5	do	1.90	72
29	J. J. Dirzulaitis	[a] 3.40	158	5	do	1.90	72
Apr. 8	do	3.90	251	28	J. J. Dirzulaitis	.80	22.3
15	do	4.20	279				
16	R. D. Cooper [b]	4.24	282	1920.			
18	do	5.38	430	Apr. 14	do	3.93	257
18	Dirzulaitis and Cooper	5.60	464	14	do	3.93	260

[a] Stage-discharge relation affected by ice.
[b] Engineer for Silver Creek Valley Irrigation District.

[1] Published in previous reports as "Silver Creek above Riley, Oreg."

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Daily discharge, in second-feet, of Silver Creek above Suntex, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	1919				1920				
	Feb.	Mar.	Apr.	May.	Jan.	Feb.	Mar.	Apr.	May.
1	.....	.....	341	112	.....	32	28	37	180
2	.....	.....	380	100	.....	32	29	34	162
3	.....	.....	398	108	.....	32	30	32	162
4	.....	.....	603	104	.....	32	31	37	144
5	.....	.....	575	69	.....	32	32	48	126
6	.....	.....	445	58	.....	32	32	95	118
7	.....	.....	328	55	.....	30	32	140	118
8	.....	.....	249	50	.....	27	32	185	118
9	82	.....	238	50	.....	24	32	195	138
10	.....	.....	406	45	.....	22	32	175	111
11	.....	.....	484	45	.....	24	32	149	95
12	.....	.....	458	41	.....	27	32	180	74
13	.....	.....	406	39	.....	30	32	219	60
14	.....	.....	304	37	.....	32	32	249	48
15	.....	.....	282	35	.....	32	32	219	43
16	.....	.....	282	33	.....	32	32	200	33
17	.....	.....	328	31	.....	32	32	180	28
18	.....	.....	432	29	120	32	32	154	25
19	.....	.....	432	29	32	31	32	200	22
20	.....	.....	380	29	22	30	32	190	22
21	.....	25	354	29	22	29	32	180	22
22	.....	100	304	27	44	27	32	215	22
23	.....	160	304	25	67	26	32	250	20
24	.....	185	293	24	80	25	32	215	20
25	.....	150	260	24	262	24	32	180	20
26	.....	140	216	24	387	25	32	180	20
27	.....	240	195	23	290	26	32	254	20
28	.....	260	205	22	319	26	32	263	20
29	.....	210	137	22	54	27	32	249	20
30	.....	240	120	22	43	.....	34	219	20
31	.....	250	.....	22	32	.....	36	.....	20

NOTE.—Discharge, Mar. 21–31, 1919, estimated because of ice, on basis of current-meter measurements observer's notes, and temperature records. Discharge interpolated for following days when gage was not read: May 27, 29, and 30, 1919, Jan. 22, Apr. 2, 22, 24, May 17, 18, 20, and 21, 1920. Gage read twice weekly during February and March, 1920; discharge interpolated for intervening days. Discharge, May 23–31, 1920, estimated. Creek practically dry prior to Mar. 2, 1919, except Feb. 9.

Monthly discharge of Silver Creek above Suntex, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919.				
March 21–31	260	25	178	3,890
April	603	120	338	20,180
May	112	22	44	2,710
The period	.....	.....	.....	26,700
1920.				
January 18–31	387	22	127	3,520
February	32	22	28.7	1,650
March	36	.....	31.9	1,960
April	263	32	171	10,200
May	180	.....	65.7	4,040
The period	.....	.....	.....	21,400

NOTE.—Total run-off for year ending Sept. 30, 1919, estimated about 27,900 acre-feet.

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SILVER CREEK BELOW RILEY, OREG.

LOCATION.—In NE. ¼ sec. 14,[1] T. 24 S., R. 27 E., three-fourths mile southwest o Cryder's ranch and 6 miles southeast of Riley post office, Harney County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 12 to June 21, 1912; May 6 to June 7, 1913; February 23 to June 20, 1914, and March 21 to May 17, 1919; fragmentary records in 1915 and 1917.

GAGE.—Vertical staff on left bank; Stevens 8-day water-stage recorder installed April 20, 1919. Gage reader, A. D. Cryder.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Gravel and small boulders, fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stages recorded as follows: 4.4 feet March 20–22, 1914 (discharge, 432 second-feet); 4.0 feet April 28, 1917 (discharge, 402 second-feet); 3.9 feet March 31, 1919 (discharge, 358 second-feet); discharge on April 6, 1919, estimated from hydrograph as 400 second-feet. Stream practically dry every summer.

ICE.—No flow during winter.

DIVERSIONS.—Several hundred acres irrigated from Silver Creek above station.

REGULATION.—None, except by irrigation dams.

ACCURACY.—Stage-discharge relation practically permanent. Well-defined rating curve used for 1914, 1915, and 1919; a slightly different curve based on measurement of May 23, used for 1917. Gage read once a day to tenths or half-tenths 1914 to 1917, and occasionally in 1919 up to April 20. Operation of recorder satisfactory. Daily discharge ascertained by applying to the rating table the daily gage reading, or the mean gage height obtained by inspecting the recorder graph. Records good for periods for which gage was read and after installation of recorder.

Discharge measurements of Silver Creek below Riley, Oreg., during the years ending Sept. 30, 1915–1919.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1915.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Apr. 12	R. D. Cooper [a]	2.51	157	Mar. 28	Dirzulaitis and Henshaw	1.81	65
1917.				28	J. J. Dirzulaitis	3.40	280
May 23	Henshaw and Briggs	2.05	114	Apr. 7	do	3.75	335
1918.				17	do	3.10	234
Apr. 20	F. F. Henshaw	1.34	10.8	18	do	3.29	277
				May 2	do	1.92	83
				11	R. D. Cooper	1.38	12.8
				17	do	1.15	[b] 4.0

[a] Engineer, Silver Creek Valley Irrigation District. [b] Estimated.

[1] Section location published in Water-Supply Paper 390 is in error.

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Daily discharge, in second-feet, of Silver Creek below Riley, Oreg., for 1914, 1915, 1917, and 1919.

Day.	1914					1915	1917		1919		
	Feb.	Mar.	Apr.	May.	June.	Mar.	Apr.	May.	Mar.	Apr.	May.
1	.....	228	185	70	7	.....	.....	.....	.....	242	102
2	.....	199	171	70	3	.....	.....	.....	.....	250	82
3	.....	64	185	58	3	.....	.....	314	.....	300	69
4	.....	90	213	51	7	.....	.....	.....	.....	320	56
5	.....	90	242	38	3	.....	.....	.....	.....	350	44
6	.....	129	300	32	3	.....	.....	343	.....	400	38
7	.....	171	300	26	3	.....	.....	.....	.....	386	30
8	.....	242	314	26	3	.....	.....	.....	.....	300	28
9	.....	257	300	26	3	.....	.....	.....	.....	250	28
10	.....	228	285	15	3	.....	.....	372	.....	230	16
11	.....	257	271	15	3	.....	.....	.....	.....	250	14
12	.....	300	271	11	2	.....	136	.....	.....	320	13
13	.....	314	242	11	2	.....	.....	343	.....	350	11
14	.....	300	228	7	7	.....	.....	.....	.....	330	9
15	.....	343	213	7	3	.....	.....	.....	.....	300	7
16	.....	358	213	7	3	.....	.....	.....	.....	270	5
17	.....	372	199	7	2	.....	.....	228	.....	242	4
18	.....	402	171	7	2	38	.....	.....	.....	271	.....
19	.....	417	171	7	1	38	.....	.....	.....	286	.....
20	.....	432	143	7	1	7	.....	.....	.....	300	.....
21	.....	432	143	5	.....	51	.....	140	10	285	.....
22	.....	432	129	5	.....	77	.....	.....	35	271	.....
23	129	417	116	11	.....	90	.....	114	150	242	.....
24	64	417	116	15	.....	129	.....	.....	160	242	.....
25	64	387	116	32	.....	143	300	.....	180	228	.....
26	90	343	103	26	.....	143	.....	.....	190	221	.....
27	77	314	90	20	.....	143	.....	.....	199	192	.....
28	143	285	90	15	.....	.....	402	.....	285	164	.....
29	.....	242	77	11	.....	.....	.....	.....	300	142	.....
30	.....	228	77	11	.....	.....	.....	.....	329	122	.....
31	.....	199	.....	7	.....	.....	.....	.....	358	.....	.....

NOTE.—Discharge for following periods estimated by comparison with records of flow at Cecil ranch and Dunn field: Mar. 20–26, 30; Apr. 2–6, 8–16, 19, 29, 30, and May 1, 1919; gage not read.

Monthly discharge of Silver Creek below Riley, Oreg., for 1914 and 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1914.				
February 23–28	143	64	94.5	1,120
March	432	64	287	17,600
April	314	77	189	11,200
May	70	5	21.2	1,300
June 1–20	7	1	3.2	127
The period	.....	.....	.....	31,300
1919.				
March 21–31	358	10	200	4,360
April	400	122	257	15,900
May 1–17	102	4	32.7	1,100
The period	.....	.....	.....	21,400

NOTE.—See daily-discharge table for fragmentary records for 1915 and 1917.

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SILVER CREEK NEAR NARROWS, OREG.

LOCATION.—In sec. 18, T. 25 S., R. 28 E., a quarter of a mile north of house at Dunn Field, 12 miles south of Riley, and 25 miles northwest of Narrows, Harney County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 8 to June 22, 1917; March 23 to May 5, 1919; and March 28 to May 17, 1920.

GAGE.—Vertical staff on right bank 200 feet below diversion dam; read by employees of William Hanley Co.

DISCHARGE MEASUREMENTS.—Made from cable 100 yards below gage or by wading near gage.

CHANNEL AND CONTROL.—One channel; smooth and straight; slightly shifting. Control not well defined. Grass grows in channel before water ceases to flow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period in 1919, 4.7 feet April 7 (discharge, 360 second-feet); stream dry up to 10 a. m. March 23 and after May 20.

Maximum stage recorded during period in 1920, 3.4 feet in morning of April 30 (discharge, 156 second-feet); creek dry after May 16.

1917–1920: Maximum discharge recorded 400 second-feet April 29 and 30, 1917; creek dry during periods in each year.

ICE.—No flow during winter.

DIVERSIONS.—From 4,000 to 5,000 acres of land, mostly in wild hay, is irrigated above the station. Dunn Field ditch diverted from 31 to 46 second-feet of water around gage April 10–18, 1919, and from 15 to 21 second-feet March 28 to April 7, and a mean of 25 second-feet May 4–6, 1920. These diversions included in determinations of discharge of Silver Creek at gaging station.

REGULATION.—Small amount of water is stored above dams and used to subirrigate lands within a few miles above the station.

ACCURACY.—Stage-discharge relation practically permanent during each period of record. Rating curve used for 1919 well defined; curve for 1920 poorly defined. Gage read to tenths twice a day. Daily discharge ascertained by applying to rating table the mean daily gage height. Records good for 1919 and poor for 1920.

Discharge measurements of Silver Creek near Narrows, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Mar. 23	F. F. Henshaw	2.49	56	Apr. 20	J. J. Dirzulaitis	2.82	90
23	do	2.68	72	20	do	2.82	92
28	J. J. Dirzulaitis	3.55	160				
Apr. 7	do	4.60	339				
17	do	3.70	[a] 181				
May 2	do	2.82	80				

[a] On April 17, 1919, flow in Dunn Field ditch was measured, as follows: Gage height, 2.40 ft.; discharge, 50 sec.-ft.

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Daily discharge, in second-feet, of Silver Creek near Narrows, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Mar.	Apr.	May.	Day	Mar.	Apr.	May.	Day.	Mar.	Apr.	May.
1919.				1919.				1920.			
1		262	114	21		300		11		14	29
2		220	89	22	0	280		12		48	10
3		228	72	23	37	262		13		30	5
4		244	57	24	76	244		14		28	2
5		262	57	25	108	228		15		42	1
6		340		26	108	228		16		126	1
7		340		27	130	204		17		110	0
8		280		28	167	160		18		116	
9		228		29	212	124		19		84	
10		219		30	228	119		20		94	
11		220		31	262			21		104	
12		286		1920.				22		126	
13		346		1		22	186	23		84	
14		346		2		19	132	24		84	
15		300		3		21	116	25		64	
16		235		4		21	98	26		60	
17		219		5		17	80	27		64	
18		219		6		20	43	28	18	94	
19		204		7		19	20	29	19	144	
20		300		8		7	23	30	25	159	
				9		14	20	31	20		
				10		20	36				

Monthly discharge of Silver Creek near Narrows, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919.				
March 23–31	262	37	148	2,640
April	346	119	248	14,800
May 1–5	114	57	77.8	772
The period				18,200
1920.				
March 30–31			20.5	163
April	150	7	61.6	3,660
May 1–16	186	0	47.8	1,510
The period				5,330

NOTE.—Discharge of Dunn Field ditch Apr. 10–18, 1919, and Mar. 28 to Apr. 7, and May 4–6, 1920, included in the above table. See "Diversions" in station description.

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MISCELLANEOUS DISCHARGE MEASUREMENTS.

Discharge measurements of streams in the Great Basin at points other than regular gaging stations, made during the years ending September 30, 1919 and 1920, are listed in the following table:

Miscellaneous discharge measurements in Great Basin during the years ending Sept. 30, 1919 and 1920.

Bear River basin.

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
1918.					
Oct. 11	Box Elder Creek	Bear River	SW. ¼ sec. 20, T. 9 N., R. 1 W., just above confluence with tailrace of Brigham municipal power plant, 1½ miles east of Brigham, Box Elder County, Utah.		8.1
1919.					
Jan. 27	do	do	do		3.7
June 3	do	do	do		4.5
1920.					
Jan. 30	do	do	do		8.2
June 9	do	do	do		3.9
Sept. 1	do	do	do		a.5

Weber River basin.

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
1919.					
June 14	Weber River	Great Salt Lake	NW. ¼ sec. 28, T. 4 N., R. 2 E., a quarter of a mile above confluence with East Canyon Creek and 3 miles northwest of Morgan, Morgan County, Utah.	1.22	310
20	do	do	do	.68	118
22	do	do	do	.53	77
25	do	do	do	.46	58
27	do	do	do	.35	43.9
28	do	do	do	.33	41.2
July 2	do	do	do	.29	35.2
7	do	do	do	.28	32.6
Aug. 9	do	do	do	.43	48.1
Sept. 17	do	do	do	.47	56
1920.					
July 10	do	do	do	.92	186
17	do	do	do	.79	94
23	do	do	do	1.02	102
30	do	do	do	1.17	141
Aug. 13	do	do	do	1.28	175
24	do	do	do	1.17	156
Sept. 9	do	do	do	1.26	170
1919.					
June 17	do	do	SE. ¼ sec. 25, T. 5 N., R. 1 W., ½ mile below diversion of Davis & Weber Counties canal and 2½ miles east of Uinta, Weber County, Utah.	1.50	80
24	East Canyon Creek	Weber River	NW. ¼ sec. 23, T. 2 N., R. 3 E., above backwater from Davis and Weber Counties reservoir, Morgan County, Utah.		13.9
1920.					
July 9	do	do	do		31.4
20	do	do	do	1.59	25.2
1919.					
June 12	do	do	NW. ¼ sec. 10, T. 2 N., R. 3 E., at Venturi flume, below Davis and Weber Counties reservoir.	1.73	38.6
15	do	do	do	1.28	15.7
16	do	do	do	1.28	17.2

a Discharge estimated.

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Miscellaneous discharge measurements in Great Basin during the years ending Sept. 30, 1919 and 1920—Continued.

Weber River basin—Continued.

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
1919. June 15	East Canyon Creek	Weber River	NE. ¼ sec. 9, T. 2 N., R. 3 E., at old measuring weirs ½ mile below Davis and Weber Counties reservoir; sill of gates used as control.	5.10	28.0
15	do	do	do	5.02	19.6
19	do	do	do	5.93	142
19	do	do	do	6.09	172
20	do	do	do	6.17	183
22	do	do	do	6.14	182
24	do	do	do	6.10	169
24	do	do	do	6.32	218
26	do	do	do	6.25	203
30	do	do	do	6.18	197
July 2	do	do	do	6.28	218
2	do	do	do	6.27	206
5	do	do	do	6.18	198
6	do	do	do	6.10	188
7	do	do	do	6.15	196
9	do	do	do	6.07	171
11	do	do	do	6.11	177
11	do	do	do.[a]	6.11	175
29	do	do	do	5.96	141
Aug. 9	do	do	do	5.74	109
27	do	do	do	5.60	87
Sept. 16	do	do	do	4.80	8.4
1920. July 8	do	do	do	5.11	28.5
9	do	do	do	5.83	126
9	do	do	do	6.24	203
11	do	do	do	6.51	265
17	do	do	do	6.53	271
20	do	do	do	6.52	272
29	do	do	do	6.52	281
Aug. 14	do	do	do	6.33	240
16	do	do	do	6.23	201
24	do	do	do	6.24	210
29	do	do	do	5.85	137
29	do	do	do	5.85	133
Sept. 9	do	do	do	5.57	89
1919. June 15	do	do	SW. ¼ sec. 31, T. 3 N., R. 3 E., at bridge known as White's crossing, 3 miles downstream from gage at weirs.		30.5
July 11	do	do	do	1.45	173
Aug. 9	do	do	do	1.20	109
Sept. 16	do	do	do	.37	9.1
1920. July 8	do	do	do	.70	35.4
9	do	do	do	1.32	133
Aug. 24	do	do	do	1.62	215
1919. Aug. 9	do	do	Immediately below heading of Littleton canal, 1½ miles west of Morgan, Morgan County, Utah.		91
1920. Sept. 9	do	do	do		72

[a] Made about 150 yards upstream as a check measurement. Several small springs enter between this point and regular section.

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Miscellaneous discharge measurements in Great Basin during the years ending Sept. 30, 1919 and 1920—Continued.

Weber River basin—Continued.

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
1919.				*Feet.*	*Sec.-ft.*
June 12	East Canyon Creek	Weber River	NW. ¼ sec. 28, T. 4 N., R. 2 E., a quarter of a mile above confluence with Weber River and 3 miles northwest of Morgan, Morgan County, Utah.		34
14	do	do	do	0.38	29.4
18	do	do	do	.98	133
20	do	do	do	1.04	152
22	do	do	do	1.00	145
25	do	do	do	1.19	198
28	do	do	do	1.13	175
July 7	do	do	do	1.10	164
29	do	do	do	1.00	128
Aug. 9	do	do	do	.87	99
27	do	do	do	.79	74
Sept. 17	do	do	do	.18	12.5
1920.					
July 10	do	do	do	[a]1.37	192
16	do	do	do	1.42	249
17	do	do	do	1.42	248
23	do	do	do	1.45	273
30	do	do	do	1.46	265
Aug. 13	do	do	do	1.30	214
24	do	do	do	1.19	190
Sept. 9	do	do	do	.77	94.3
1919.					
May 20	Hauter Spring	Thaynes Canyon	Sec. 9, T. 2 S., R. 4 E., at outlet of ice pond ½ mile north of Park City, Summit County, Utah.		2.7
1920.					
July 20	Taylor Creek	East Canyon Creek	SW. ¼ sec. 14, T. 2 N., R. 3 E., just above backwater of Davis and Weber Counties reservoir.		1.2
1919.					
June 15	Sheep Creek	do	NE. ¼ sec. 6, T. 2 N., R. 3 E., just above confluence with East Canyon Creek.		2.9
1920.					
July 17	do	do	do		2.1
1919.					
June 15	Porterville canal	do	NW. ¼ sec. 31, T. 3 N., R. 3 E., 300 feet below head of canal and 3 miles southeast of Porterville, Morgan County, Utah.	1.50	10.6
24	do	do	do	1.34	7.3
July 11	do	do	do	1.15	4.3
1920.					
July 12	do	do	do	1.71	11.9
17	do	do	do	1.70	12.9
27	do	do	do	[b]1.99	12.3
Aug. 24	do	do	do	.75	7.2
Sept. 9	do	do	do	.79	7.9
1919.					
June 15	Hardscrabble Creek	do	SW. ¼ sec. 24, T. 3 N., R. 2 E., 300 feet above confluence with East Canyon Creek, 0.3 mile south of store at Porterville, Morgan County, Utah.	1.13	6.9
July 11	C. G. Porter canal	do	Culvert under main road at Porterville, Utah.		3.1
1920.					
July 17	do	do	do		1.4

[a] Datum raised 0.10 foot.

[b] Datum raised 0.70 foot.

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Miscellaneous discharge measurements in Great Basin during the years ending Sept. 30, 1919 and 1920—Continued.

Weber River basin—Continued.

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
1919. June 15	East Richville canal	East Canyon Creek	NW. ¼ sec. 24, T. 3 N., R. 2 E., at head of canal, at Porterville, Utah.	1.33	7.2
16	do	do	do	1.21	6.5
26	do	do	do	1.15	5.5
July 7	do	do	do	.78	3.6
11	do	do	do	.70	2.8
1920. July 12	do	do	do	1.11	6.7
12	do	do	do	1.30	7.9
17	do	do	do	1.26	9.0
27	do	do	do	1.23	7.1
Aug. 14	do	do	do	.73	1.2
24	do	do	do	1.06	4.8
Sept. 9	do	do	do	.74	1.7
1919. June 15	West Richville canal	do	NE. ¼ sec. 14, T. 3 N., R. 2 E., at head of canal, 1½ miles northwest of Porterville, Utah.		16.9
16	do	do	do	1.20	18.5
23	do	do	do	1.58	28.2
26	do	do	do	.99	12.0
28	do	do	do	1.42	24.0
July 7	do	do	do	.86	10.9
9	do	do	do	1.04	14.4
11	do	do	do	.74	7.3
1920. July 12	do	do	do	1.56	24.8
12	do	do	do	1.18	14.6
15	do	do	do	1.74	28.3
17	do	do	do	2.00	25.5
28	do	do	do	1.22	16.6
Aug. 24	do	do	do	1.20	16.3
Sept. 9	do	do	do	.77	6.9
1919. June 15	Welch canal	do	NE. ¼ sec. 11, T. 3 N., R. 2 E., near head of canal, 2 miles southwest of Morgan, Utah.	1.12	6.3
30	do	do	do	1.40	9.4
July 2	do	do	do	.98	4.9
9	do	do	do	.86	3.5
11	do	do	do	.74	2.2
1920. July 12	do	do	do	1.57	6.3
17	do	do	do	1.52	7.1
Aug. 14	do	do	do	2.13	6.5
24	do	do	do	.55	5.6
Sept. 9	do	do	do	1.37	4.8
1919. June 15	Littleton canal	do	SW. ¼ sec. 35, T. 4 N., R. 2 E., near head of canal, 1½ miles west of Morgan, Utah.	.89	10.7
16	do	do	do	.81	9.8
23	do	do	do	1.21	17.4
24	do	do	do	.34	1.6
24	do	do	do	.75	7.6
26	do	do	do	1.06	14.8
July 1	do	do	do	.62	5.8
11	do	do	do	.42	2.6
1920. July 12	do	do	do	.86	8.0
17	do	do	do	.91	11.4
29	do	do	do	.77	8.7
Sept. 9	do	do	do	.75	6.1

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Miscellaneous discharge measurements in Great Basin during the years ending Sept. 30, 1919 and 1920—Continued.

Weber River basin—Continued.

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
1919. June 25	Milton canal	Weber River	NW. ¼ sec. 21, T. 4 N., R. 2 E., near head of canal, 4 miles northwest of Morgan, Utah.	1.50	2.4
July 1	do	do	do	1.91	6.0
12	do	do	do	1.85	4.7
1920. July 28	do	do	do	1.89	4.0
1919. June 27	Lower River canal	do	NW. ¼ sec. 8, T. 4 N., R. 2 E., near head of canal, 2 miles southeast of Peterson, Morgan County, Utah.	1.25	10.0
July 1	do	do	do	1.11	8.7
12	do	do	do	.66	2.0
1920. July 28	do	do	do	1.01	6.5
1919. June 18	Bowman canal	do	SW. ¼ sec. 31, T. 5 N., R. 2 E., near head of canal and just across Southern Pacific tracks from stockyards at Peterson, Utah.	.91	2.4
27	do	do	do	.86	2.7
July 12	do	do	do		1.9
June 17	Davis & Weber Counties Canal Co.'s canal.	do	SE. ¼ sec. 25, T. 5 N., R. 1 W., half a mile below head of canal, 3 miles southeast of Uinta, Weber County, at Utah Power & Light Co.'s gaging station.	3.10	277
19	do	do	do	3.05	257
July 13	do	do	Sec. 19, T. 5 N., R. 1 W., below diversion for Riverdale power plant, at Utah Power & Light Co.'s gaging station.	2.22	157
1920. July 17	do	do	do	2.43	215

Jordan River basin.

1919. July 22	Strawberry tunnel	Sixthwater Creek	Sec. 34, T. 7 S., R. 6 E., at west portal (outlet) at United States Reclamation Service gage, near Mill Fork, Utah.	2.60	212
22	do	do	do	2.60	209
1920. June 11	Mill Creek	Jordan River	Sec. 26, T. 1 S., R. 2 E., above intake for upper power plant, near Salt Lake City, Utah.		29.6

Sevier Lake basin.

1919. July 8	Sevier River	Sevier Lake	SW. ¼ sec. 25, T. 30 S., R. 4 W., below Dalton canal heading, at Circleville, Utah.		2.7
1918. Oct. 2	do	do	1,000 feet west of corner, to Tps. 22 and 23 S. and Rs. 1 and 2W. Below tailrace of Jumbo Plaster Co., ¼ mile east of Sigurd, Utah.	1.38	98

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Miscellaneous discharge measurements in Great Basin during the years ending Sept. 30, 1919 and 1920—Continued.

Sevier Lake basin—Continued.

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
1919.				*Feet.*	*Sec.-ft.*
June 30	Sevier River	Sevier Lake	SW. ¼ sec. 13, T. 18 S., R. 1 W., at former gaging station, "Sevier River at Clarks bridge, near Fayette, Utah."	2.92	86
Oct. 17	do	do	SW. ¼ sec. 28, T. 14 S., R. 3 W., 2,000 feet below Sevier River Land & Water Co.'s canal heading, near Leamington, Utah.		8.8
May 17	Vaeter canal	Sevier River	SW. ¼ sec. 10, T. 33 S., R. 5 W., at head, near Panguitch, Utah.	.75	7.2
June 9	do	do	do	.57	5.0
27	do	do	do	.74	8.4
July 17	do	do	do	.60	5.8
Aug. 5	do	do	do	.87	11.3
22	do	do	do	.44	4.1
Sept. 23	do	do	do	.69	7.4
July 1	Sevier Valley canal	do	Sec. 10, T. 24 S., R. 2½ W., a quarter of a mile above slaughter house near Richfield, Utah.		174
May 8	State canal	Sevier Valley canal	Sec. 25, T. 22 S., R. 1 W., at bridge, at Vermillion, Utah.		154
8	do	do	Sec. 7, T. 22 S., R. 1 W., at Curtis Bridge, near Aurora, Utah.		112
Apr. 23	do	do	Sec. 6, T. 22 S., R. 1 W., at 24-foot drop, near Aurora, Utah.	4.04	86
May 7	do	do	do	4.43	84
June 13	do	do	do	4.38	80
July 14	do	do	do	4.46	95
31	do	do	do	4.50	99
Aug. 21	do	do	do	4.50	97
May 7	do	do	Sec. 20, T. 21 S., R. 1 W., at Denmark Wash, near Salina, Utah.	2.80	60
7	do	do	do	2.65	52
June 13	do	do	do	2.50	40
21	do	do	do	3.52	88
10	do	do	Sec. 28, T. 18 S., R 1 W., at Jap Gulch, near Fayette, Utah.		5.7
May 2	Wellington canal	Sevier River	Sec. 3, T. 16 S., R. 2 W., at former gaging station, "Wellington canal near Mills, Utah."	2.06	23.2
June 24	do	do	do	2.10	24.6
Apr. 24	McIntyre canal	do	Former gaging station, "McIntyre canal near Leamington, Utah."	1.22	4.7
June 25	do	do	do	1.79	20.8
May 23	Sevier River Land & Water Co.'s canal.	do	Head of Pavant canal, at Whiskey Creek bridge, near Delta, Utah.	4.88	157

Beaver River basin.

1918.					
Dec. 15	Cedar City municipal power plant tailrace.	Coal Creek	Sec. 13, T. 36 S., R. 11 W., at power plant 2 miles above Cedar City, Utah.		0.6
1919.					
Mar. 17	do	do	do		5.8
Aug. 16	do	do	do		2.1
Mar. 14	Pinto Creek	Escalante desert	Sec. 21, T. 36 S., R. 15 W., at ranch above dam, near Newcastle, Utah.		7.6
15	do	do	do	0.91	1.8
May 20	do	do	do	.41	9.6

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Miscellaneous discharge measurements in Great Basin during the years ending Sept. 30, 1919 and 1920—Continued.

Owens Lake basin.

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
1920. Aug. 15	Rock Creek	Owens River	160 feet above mouth		47

Walker Lake basin.

1918. Dec. 19	East Walker River	Walker River	Sec. 26, T. 12 N., R. 25 E., at highway bridge 2¼ miles above mouth, and 7 miles above Mason, Nev.	2.40	85

Humboldt-Carson Sink basin.

1919. June 27	Hangman Creek	East Fork of Carson River.	Above gage on East Fork of Carson River near Markleeville, Calif.		0.5
1920. July 27	do	do	Mouth		0
1919. May 30	Snowshoe-Thompson canal.	West Fork of Carson River.	Sec. 24, T. 11 N., R. 19 E., at Woodfords, Calif.		8.4
Aug. 9	do	do	do		6.6
May 30	Millick canal	do	do		8.7
Aug. 9	do	do	do		a 1.5
May 30	Ellis and Dudley canal	do	do		10.1
Aug. 9	do	do	do		2.9
9	Woodfords canal	do	do		a.5

Honey Lake basin.

1918. Dec. 20	Long Valley Creek	Honey Lake	Abandoned U. S. Geol. Survey gaging station near Doyle, Calif.		0
1919. Mar. 4	do	do	do	3.94	68
7	do	do	do	3.88	38
1920. Aug. 2	Susan River	Honey Lake	Southern Pacific Railroad bridge near Susanville, Calif.		4.3
1919. Sept. 21	Electric Light Co.'s flume.	Susan River	Gage No. 1 near head gate, Calif.	.88	3.5
21	do	do	do	.22	.5
21	do	do	do	1.24	6.6
1920. Aug. 2	do	do	do	.75	5.5
1919. Sept. 21	do	do	Gage No. 2 opposite gage on Susan River, Calif.	3.36	.8
21	do	do	do	3.70	3.5
1920. Aug. 2	do	do	do	3.22	.2
1918. Dec. 21	Ramsey ditch	do	Susanville, Calif.		2.6
1919. Mar. 5	do	do	do		.9
Apr. 18	do	do	do		0
May 16	do	do	do		3.0
July 7	do	do	do		5.2
Sept. 21	do	do	do		2.2
21	Overflow at waterworks.	do	do		.4

a Estimated.

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Miscellaneous discharge measurements in Great Basin during the years ending Sept. 30, 1919 and 1920—Continued.

Surprise Valley.

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
1918.					
Dec. 8	Cedar Creek	Middle Alkali Lake	Near Cedarville, Calif.		0.4
1919.					
Mar. 10	do	do	do		1.7
May 19	do	do	do		13.0
June 11	do	do	do	2.13	2.9
25	do	do	do	2.03	1.5
Sept. 24	do	do	do	2.88	.01
June 11	Deep Creek	do	do	.56	1.6
25	do	do	do	.40	.8
Sept. 24	do	do	do	.26	.4
1919.					
Mar. 13	Bidwell Creek	Upper Alkali Lake	2 miles below gage near Fort Bidwell, Calif.		1.0
29	do	do	do		7.5
1918.					
Dec. 10	do	do	Below Baty, Christie, Fee, Smith ditch below Fort Bidwell, Calif.		1.3
1919.					
Mar. 12	do	do	do		2.5
14	do	do	do		1.9
21	do	do	do		3.0
28	do	do	do		13
Apr. 1	do	do	do		27
13	do	do	do		25
May 20	do	do	Below all diversions		12
31	do	do	do		3.0
June 10	do	do	do		.1
21	do	do	do		.2
July 2	do	do	do		.0
Oct. 3	do	do	do		.02
Mar. 29	Harper Creek	Bidwell Creek	Mouth, near Fort Bidwell, Calif.		15
May 1	do	do	do		55
24	do	do	do		24
June 4	do	do	do		13
16	do	do	do		3.1
July 1	do	do	do		5.7
Oct. 2	do	do	do		2.7
Mar. 13	West Fork of Bidwell Creek.	do	do		2.1
29	do	do	do		1.0
May 1	do	do	do		1.4
24	do	do	do		.4
June 4	do	do	do		3.0
16	do	do	do		1.6
July 1	do	do	do		1.4
Oct. 2	do	do	do		.3
1918.					
Dec. 10	Blunt ditch	do	Head near Fort Bidwell, Calif.		0
1919.					
Oct. 3	do	do	do		0
1918.					
Dec. 10	Martin, Boucher ditch.	do	Martin's ranch, near Fort Bidwell, Calif.		.1
1919.					
Apr. 13	do	do	do		.1
22	do	do	do		.7
May 3	do	do	do		.9
12	do	do	do		1.0
20	do	do	do		.5
31	do	do	do		.6
June 10	do	do	do		2.8
21	do	do	do		1.3
July 2	do	do	do		1.0
Oct. 3	do	do	do		1.0

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Miscellaneous discharge measurements in Great Basin during the years ending Sept. 30, 1919 and 1920—Continued.

Surprise Valley—Continued.

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
1918.					
Dec. 10	Martin ditch	Bidwell Creek	Martin's ranch, near Fort Bidwell, Calif.		0
1919.					
May 20	do	do	do		.8
31	do	do	do		1.7
June 10	do	do	do		1.3
21	do	do	do		1.3
July 2	do	do	do		0
Oct. 3	do	do	do		0
1918.					
Dec. 10	McConnoughy ditch	Bidwell Creek	Road crossing near Fort Bidwell, Calif.		.2
1919.					
Mar. 14	do	do	do		.1
21	do	do	do		.5
28	do	do	do		1.9
Apr. 1	do	do	do		1.3
13	do	do	do		.8
22	do	do	do		.6
May 3	do	do	do		.8
12	do	do	do		.3
20	do	do	do		2.9
31	do	do	do		1.7
June 10	do	do	do		1.2
21	do	do	do		1.7
July 2	do	do	do		.4
Oct. 3	do	do	do		.05
Mar. 14	Peterson ditch	do	do		.0
May 12	do	do	do		1.4
20	do	do	do		3.0
May 31	do	do	do		.7
June 10	do	do	do		1.4
21	do	do	do		1.5
July 2	do	do	do		2.1
Oct. 3	do	do	do		.04
1918.					
Dec. 10	Conlan ditch	do	do		.2
1919.					
Mar. 12	do	do	do		.8
14	do	do	do		.4
21	do	do	do		.6
28	do	do	do		2.6
Apr. 1	do	do	do		3.2
13	do	do	do		2.8
22	do	do	do		7.7
May 3	do	do	do		9.6
12	do	do	do		6.9
20	do	do	do		12.
31	do	do	do		6.0
June 10	do	do	do		2.4
21	do	do	do		2.7
July 2	do	do	do		2.0
Oct. 3	do	do	do		.5
1918.					
Dec. 10	Hickerson, Peterson ditch.	do	do		.0
1919.					
Apr. 1	do	do	do		.1
13	do	do	do		.1
22	do	do	do		.8
May 3	do	do	do		1.0
12	do	do	do		1.0
20	do	do	do		1.0
31	do	do	do		1.5
June 10	do	do	do		.5
21	do	do	do		.9
July 2	do	do	do		.3
Oct. 3	do	do	do		.2
1918.					
Dec. 10	McConnoughy, Peterson ditch.	do	do		1.3

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Miscellaneous discharge measurements in Great Basin during the years ending Sept. 30, 1919 and 1920—Continued.

Surprise Valley—Continued.

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
1919.					
Mar. 12	McConnoughy, Peterson ditch.	Bidwell Creek	Road crossing near Fort Bidwell, Calif.		2.0
14	do	do	do		1.7
21	do	do	do		1.4
28	do	do	do		1.7
Apr. 1	do	do	do		.4
13	do	do	do		1.3
22	do	do	do		2.4
May 3	do	do	do		9.6
12	do	do	do		9.4
20	do	do	do		7.8
31	do	do	do		8.4
June 10	do	do	do		4.5
21	do	do	do		4.0
July 2	do	do	do		2.0
Oct. 3	do	do	do		.7
1918.					
Dec. 10	Fee, Fee, Monroe, Smith ditch.	do	do		.3
1919.					
Mar. 12	do	do	do		.3
14	do	do	do		.3
21	do	do	do		.3
28	do	do	do		3.5
Apr. 1	do	do	do		4.0
13	do	do	do		.4
22	do	do	do		.4
May 3	do	do	do		.1
12	do	do	do		12.3
20	do	do	do		22.3
31	do	do	do		11.8
June 10	do	do	do		7.0
21	do	do	do		.2
July 2	do	do	do		.1
Oct. 3	do	do	do		.4
1918.					
Dec. 10	Baty, Christie Fee, Smith ditch.	do	do		0
1919.					
Mar. 28	do	do	do		3.0
Apr. 1	do	do	do		.5
May 3	do	do	do		2.7
12	do	do	do		2.8
20	do	do	do		9.1
31	do	do	do		.2
June 10	do	do	do		1.0
21	do	do	do		0
July 2	do	do	do		0
Oct. 1	do	do	do		0
1918.					
Dec. 10	Baty, Baty, Fee ditch.	do	do		.2
1919.					
Mar. 12	do	do	do		.4
14	do	do	do		.6
21	do	do	do		.6
28	do	do	do		.4
Apr. 1	do	do	do		1.0
13	do	do	do		.5
22	do	do	do		.8
May 3	do	do	do		4.8
12	do	do	do		2.0
20	do	do	do		4.6
31	do	do	do		.4
June 10	do	do	do		1.6
21	do	do	do		.1
July 2	do	do	do		.2
Oct. 3	do	do	do		.5
Mar. 12	Baty, Fee, Sessions ditch.	do	Near road below Fort Bidwell, Calif.		0
Apr. 1	do	do	do		1.5
13	do	do	do		.1
22	do	do	do		2.4

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Miscellaneous discharge measurements in Great Basin during the years ending Sept. 30, 1919 and 1920—Continued.

Warner Lakes basin—Continued.

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
1919.				*Feet.*	*Sec.-ft.*
May 27	Barry, Frakes, Frakes, Cressler ditch.	Twentymile Creek	Head gate below gage on Twentymile Creek, Oreg.		1.4
June 6	do	do	do		1.0
20	do	do	do		1.0
Sept. 28	do	do	do		1.2
Apr. 7	Wakefield ditch	do	do		.5
25	do	do	do		.1
May 26	do	do	do		1.9
June 6	do	do	do		1.3
20	do	do	do		.1
Sept. 28	do	do	do		0
Apr. 7	Wheeler ditch	do	do		.2
25	do	do	do		.1
May 26	do	do	do		.1
June 6	do	do	do		.1
20	do	do	do		0
Sept. 23	do	do	do		0
May 6	Conlan ditch	Dismal Creek	Road above gage on Dismal Creek near Warner Lake, Oreg.		0
23	do	do	do		1.3
June 5	do	do	do		1.4
17	do	do	do		.4
30	do	do	do		.1
Oct. 1	do	do	do		.5
May 6	Billups ditch	do	do		1.1
23	do	do	do		1.4
June 5	do	do	do		1.4
17	do	do	do		.9
30	do	do	do		1.4
Oct. 1	do	do	do		.2
May 6	Cressler ditch	Deep Creek	Near head, below gage on Deep Creek below Dismal Creek, Oreg.		55
23	do	do	do		57
June 5	do	do	do		22
17	do	do	do		13
30	do	do	do		16
Oct. 1	do	do	do		1.8
May 9	Crump ditch	do	Near head above gage on Deep Creek at Adel, Oreg.		2.0
June 2	do	do	do		3.1
13	do	do	do		1.9
27	do	do	do		1.2
Sept. 29	do	do	do		.7
May 9	Morris-Fitzgerald ditch	do	do		10
June 2	do	do	do		8.6
13	do	do	do		9.8
27	do	do	do		8.2
Sept. 29	do	do	do		1.1
June 27	Messner-Wible ditch	do	do		1.8
Sept. 29	do	do	do		.6
May 9	Messner ditch	Messner-Wible ditch	Below head of Wible ditch, Oreg.		1.0
June 2	do	do	do		1.1
13	do	do	do		.4
May 9	Wible ditch	do	Below head of Messner ditch, Oreg.		1.1
June 2	do	do	do		.7
13	do	do	do		.2
May 9	Givans ditch	Deep Creek	Near head above gage on Deep Creek at Adel, Oreg.		2.3
June 2	do	do	do		.8
13	do	do	do		5.4
27	do	do	do		1.0
Sept. 29	do	do	do		.3
Mar. 17	M. C. ditch	do	Near head below gage on Deep Creek at Adel, Oreg.		2.1
Apr. 7	do	do	do		35
May 9	do	do	do		114
June 2	do	do	do		80
2	do	do	do		115
13	do	do	do		55
27	do	do	do		8.1
Sept. 29	do	do	do		6.0

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Miscellaneous discharge measurements in Great Basin during the years ending Sept. 30, 1919 and 1920—Continued.

Summer Lake basin.

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
1919.					
Mar. 28	Ana River	Summer Lake	SE. ¼ sec. 6, T. 30 S., R. 17 E., near Summer Lake, Oreg.		120
Aug. 31	do	do	do		121
1920.					
Mar. 24	do	do	do		115
Aug. 6	do	do	do		114

Silver Lake basin.

1919.					
Apr. 17	Inlet	Silver Lake	Highway bridge 6 miles east of Silver Lake post office, Oreg., in NW. ¼ sec. 22, T. 28 S., R. 15 E.		15.3
22	do	do	do		55
May 17	do	do	do		0
1920.					
Mar. 19	Buck Creek	Paulina Marsh	Howard ranch, above gaging station near Silver Lake, Oreg.	0.66	5.9

Malheur Lake basin.

1919.					
Apr. 9	East Fork of Silvies River.	Malheur Lake	Bridge in sec. 5, T. 25 S., R. 33 E., ½ mile south of Lawen, Oreg.		44.2
25	do	do	do		78
May 27	do	do	do		6.5
Mar. 27	Riddle Creek	Barton Lake	Riddle ranch, in sec. 7, T. 29 S., R. 34 E., Oreg.	1.15	16.2
Apr. 4	do	do	do	3.60	122
21	do	do	do	2.05	54
May 26	do	do	do	1.40	14.6
1920.					
Apr. 18	Schaper ditch	Diverts from Donner und Blitzen River.	"Grain camp," near Narrows, Oreg.	1.00	17.9
18	Larson ditch	do	do	.60	.5
June 9	Westside ditch	do	do	1.60	5.4
10	do	do	do	2.50	17.7
July 12	do	do	do	2.70	5.1

Harney Lake basin.

1919.					
Mar. 23	Rock Quarry (Pine Springs) Creek.	Silver Creek	Sec. 27, T. 23 S., R. 27 E., 4 miles east of Riley, Oreg.		197
23	"OO" Spring	Harney Lake	Sec. 34, T. 26 S., R. 28 E., Oreg.		15.2
Sept. 5	do	do	do		15.0
Mar. 23	"OO" barnyard spring	do	Sec. 36, T. 26 S., R. 28 E., Oreg.		6.0
Sept. 5	do	do	do		9.2

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